IMPULSE

JEROME J. LOHR COLLEGE OF ENGINEERING

FALL 2020

Bruce Berdanier
Dean, Jerome J. Lohr College of Engineering

MORE ENGAGEMENT, INNOVATION AND SUCCESS

Greetings from Jerome J. Lohr College of Engineering!

"It's hard to imagine what our college will be like in the future." Those are the words that I used to start my spring 2020 Impulse column this past February. I didn't have any idea what our work and day-to-day lives would become just a half year later.

We have definitely moved to a time period that seems at once to be the fastest evolving as well as frozen and timeless. I hope you and all of your colleagues and loved ones are finding ways to adapt and thrive.

Our applied research and development work is really starting to get organized. The hard work of Associate Dean for Research Rajesh Kavaserri and Research Park CEO and Executive Director Dwaine Chapel is beginning to yield new and deepening relationships for the future.

We are pleased to announce the addition of Brent Meredith to our associate dean of research office. Brent brings a wealth of experience supporting research development in pharmacy at SDSU as well as medicine and engineering in California.

Also check out the new COVID-19 research being led by Xijin Ge and the world-class research and development being conducted in our Image Processing Laboratory.

After many years of sustained effort, we took new steps forward to finally bring our stand-alone Ph.D. program in mechanical engineering to life and will initiate our collaborative Ph.D. in computer science with Dakota State University in fall 2021. We also expanded our collaborative work with Capital Card Services to support the Faculty Fellows in Math and Statistics.

NEW DUTIES FOR GENT

Steven Gent, the previous Lohr College of Engineering associate dean for research, has taken over leadership of the North Central Sun Grant Center at SDSU. Steve will lead the facilitation of research activities for the North Central Region (Iowa, Illinois, Indiana, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wisconsin and Wyoming).

Recruiting new students and retaining the students that come to SDSU are two of the main components for future success of our programs. Sanna Strenge, our professional first year advisor, discusses student success.

Pete Roberts has also joined the dean's office staff as a regional recruiter as well as marketing and communications outreach for the college. Pete's position is newly created through a gift from Jerry Lohr, and so very much needed in these competitive times, especially with the recent retirement of Rich Reid.

ONE DAY FOR STATE SUCCESS

We had a very successful One Day for STATE Campaign Sept. 10 with 254 donors contributing $118,664 to the college. About $50,000 of these funds are specifically from the Beavers Charitable Trust and will be used to fund a new professor of practice in heavy construction in the Department of Construction and Operations Management.

All of the college's remaining One Day for STATE funds that were not specifically designated will again go to support the national efforts of our student competition teams. Please browse through the articles discussing the virtual success of our competition teams over the past year. Let's hope we have COVID-19 under some control so that many of these national competitions can proceed.

I ended my spring 2020 column with the words, "The SDSU campus is coming out of hibernation." It seems in some ways that we never fully came out of hibernation during 2020. I look forward to the continued success and devlopments of engineering, science and medicine in the United States, and with fervent hopes for all of us for 2021.

I sincerely hope that we see you on campus in 2021.

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ABOUT THE COVER

SDSU Image Processing Lab Director Larry Leigh, left, and research associate Pedro Oliverira discuss the functionality of the FLARE system, which uses convex mirrors to redirect the sun's rays toward satellite sensors.

SEE STORY PAGE 20.

IMPULSE

FALL 2020

FEATURES

NEW ASSOCIATE DEAN AIMS TO GROW ENGINEERING RESEARCH

Rajesh Kavasseri has a doctorate in electrical engineering; not the background one would expect to find in a cheerleader.

But in some ways, that is the job of the new associate dean of research in the Jerome J. Lohr College of Engineering.

After an 18-year career in electrical power systems at North Dakota State University, Kavasseri has shelved his own research efforts. Now, "my primary goal is to help others succeed," said Kavasseri, who began his SDSU position June 22. Since July 2018, he had been a professor and graduate coordinator in the Department of Electrical and Computer Engineering at North Dakota State University in Fargo.

Kavasseri succeeds Steve Gent, who held the position on an interim basis after Dennis Helder retired June 21, 2019.

In simplest terms, Kavasseri's duties are to assist with research and economic development activities for the college. Implicit in that is to grow research as it is measured in external funding and in academic prestige and to help the college expand its economic development activities, he said.

WANTS TO INCREASE USE OF RESEARCH LABS

For fiscal year 2019, the college's external funding and research expenditures were just over $4 million. External funding had been near the $5 million mark the previous two years.

External factors, such as availability of federal funds for research, affect those marks, but Kavasseri said the college has excellent facilities that could be better utilized.

He cited such facilities as Daktronics Engineering Hall's clean room for micro and nanoscale device fabrication; the manufacturing and robotics labs in the mechanical engineering department, the Lohr Structures Lab in Crothers Engineering Hall as well as the renowned image processing lab for geospatial analysis and satellite calibration.

Then there is Kavasseri's research area—bulk electric power systems, which form the nation's backbone for electricity.

Less than a month into his job, Kavasseri was already gaining a grasp of the research taking place in the college and working to develop a dashboard that would provide that information at a glance. "Even if we can grow that research by 10% every year, that would be great," Kavasseri said. "I want to help these groups find the right synergies to expand on their research, which is becoming increasingly collaborative and multidimensional."

ENVISIONS NATIONAL CALIBER RESEARCH

He also wants communities to see the college as a partner, citing examples in other cities where university-developed technologies were adopted by civic and municipal entities to improve the quality of life.

What are the biggest challenges to make these goals a reality?

Kavasseri said, "Getting the critical mass in each area. At a land-grant university, everyone is doing everything. You can get a little diluted. But we can build up one group and then the next. I plan to identify the top three research areas in the college and get them to a national level; to get them to the national level will be a challenge."

But it is a challenge he is up to, according to Dean Bruce Berdanier.

"Dr. Kavasseri rose to the top of an impressive field of candidates in our interview process. I view him as a thoughtful leader in his concepts for creating collaborations through public and private partnerships as well as the advances in research that can be accomplished at the interfaces of different areas of technical expertise.

"He has had a distinguished academic career ... and he is recognized as a senior member of the Institute of Electrical and Electronics Engineers," Berdanier said.

FAMILY STILL IN FARGO

Kavasseri holds a doctorate in electrical engineering from Washington State (2002) and master's and bachelor's degrees in electrical engineering from India (1995, 1998). He became an assistant professor at North Dakota State in 2002 after spending four years as a research assistant at Washington State University in Pullman. He also spent summer 2009 as a visiting professor in India.

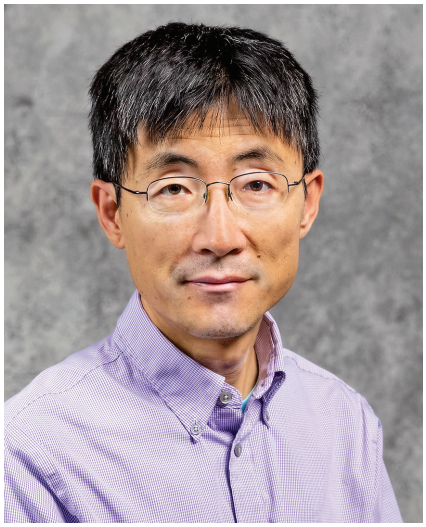
Kavasseri's spouse, Prabha, is also an electrical engineer working for a consulting firm in Fargo. Their son, Padmanabha, is majoring in computer science and computer engineering at the University of Southern California in Los Angeles. Their daughter, Abhijna, is a freshman at Fargo North High School.

Dave Graves

NIH GRANT

WILL IMPROVE GENOMIC ANALYSIS WEBSITE

A website used by more than 20,000 scientists to analyze their genomic data is getting an upgrade, thanks to a four-year, nearly $870,000 National Institutes of Health grant.



Professor Xijin Ge of SDSU's Department of Mathematics and Statistics developed the integrated differential expression and pathway tool, known as iDEP, to help researchers decipher their RNA sequence data. The free website, http://bioinformatics.sdstate.edu/idep, has been available since 2017.

"I specialize in bioinformatics, a relatively new field focused on the analysis of genomics data," explained Ge. "Biologists today are flooded with data. Lack of access to bioinformaticians is a critical barrier for many researchers, especially those in institutions with limited resources. Our goal is to empower biologists to analyze their own data, interactively and reproducibly."

The iDEP site allows researchers to visualize changes in gene expression, meaning the RNAs that code for proteins, based on various experimental conditions. These comparisons can tell a scientist, for instance, how plant tissues respond to drought.

HOW IDEP BEGAN

Initially, Ge developed iDEP for SDSU researchers who wanted to analyze RNA sequence data from soybeans. To fulfill their request, he wrote code to do statistical analyses and produce visual interpretations of the gene expression data.

A few months later, he got a similar request from SDSU researchers working with mice. "I tweaked the code a little bit and gave the results to the second group of researchers," he said. "I realized that the same code base could benefit many others—that was the starting point for this project."

Ge used Shiny, a software package in the statisticians' R language, to build the interactive webpages that deliver the data analytics. He then worked with the Office of Research Computing to transfer the code and host iDEP on the university server, using the high-performance computing facilities.

"We made it powerful yet easy to use," Ge said. "The site offers, not just analytics, but also precompiled annotation data, which is essential for the interpretation of genomic data." Through the web interface, researchers can access annotation data for more than 2,500 species of organisms.

"Scientists can get more results per click than at any other website," Ge said, noting researchers can generate 30 to 40 different graphs to visualize gene interactions, be they from bacteria, plants, animals or human tissues.

UPGRADING WEBSITE

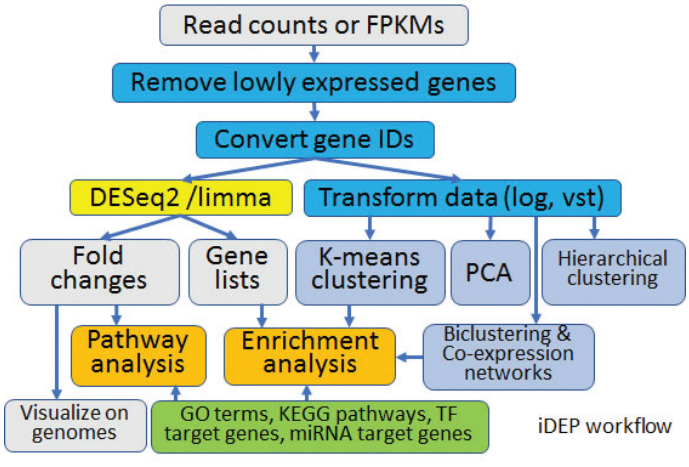
The SDSU team will make substantial improvements to the website through the NIH R01 grant, which allows it to apply for a continuation award during the project's final year. "We will convert a prototype into a mature bioinformatics tool," Ge said.

He will hire a software developer to help rewrite the code and at least two graduate students will work on the project. Furthermore, Ge said, "In addition to user suggestions, we have many ideas, including local installation and automatic reports."

Ge and his team will also increase the number of RNA sequence databases to which researchers can compare their results. In addition, a postdoctoral research associate will maintain the databases and provide customer outreach and support.

"It will be like running a small business, to some extent, and we want to use the website ourselves to do some research, too," Ge concluded.

Christie Delfanian



This flowchart shows the functions scientists can perform using the iDEP website. Through a four-year, nearly $870,000 National Institutes of Health grant, professor Xijin Ge of the Department of Mathematics and Statistics will make improvements to iDEP that "will convert the prototype into a mature bioinformatics tool." More than 20,000 scientists worldwide have used iDEP to analyze their RNA sequence data in the last three years.

QUESTIONS TO ADVISERS
GO BEYOND CLASS SCHEDULES

First-year academic adviser Sanna Strenge is fielding a different set of questions from engineering students this fall.

Typically, she would be asked how to get involved in engineering clubs or how to prepare for the career fair. Those questions certainly still exist, but they're being outpaced by a more basic question: How do I connect with fellow students?

Though most of the students Strenge talks with live in residence halls, social distancing and restrictions on large group assemblies have reduced the opportunities for students to get to know one another. That's particularly acute for students from outside the tri-state region who didn't have fellow classmates follow them to Brookings.

The concerns came after students had gotten to campus and figured out that social engagement has been difficult to do, Strenge said.

"So many of their classes are online, they don't have an opportunity to meet people. Professional advisers are racking their brains to come up with ideas. Some of our suggestions are to make use of online tutoring opportunities, go into study rooms to listen to Zoom lecturers and go to lunch or the gym with someone," Strenge said.

MUSIC PROVIDES SOCIAL OUTLET

Amanda DeBates, a mechanical engineering freshman from Sioux City, Iowa, said, "There hasn't been a lot of activities and on-campus stuff like normal. Almost everything is virtual. With social distancing and wearing masks on top of being new to college, it has been a roller coaster for sure."

The Honors Hall student said her Principals of Microeconomics class is being taught in the cavernous stadium club. A math class is split into three groups. She attends on Monday, but Wednesday and Friday it's online for DeBates. Overall, she feels good about her freshman year.

"We've all been going with the flow. Everyone is learning together, trying to get through it," DeBates said.

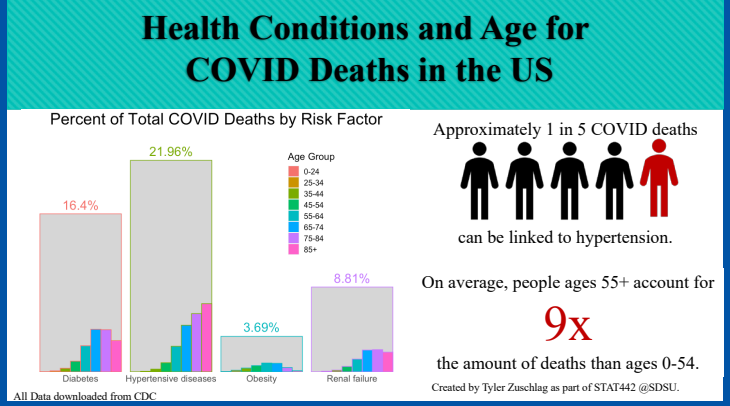
Music has been a social highlight for her. She said she hasn't felt a sense of isolation because "I am in marching band and a bunch of music classes. Marching band is a great place because we're all a big family and in orchestra we're a big family, too," said DeBates, who plays the trumpet in marching band and the bass in orchestra.

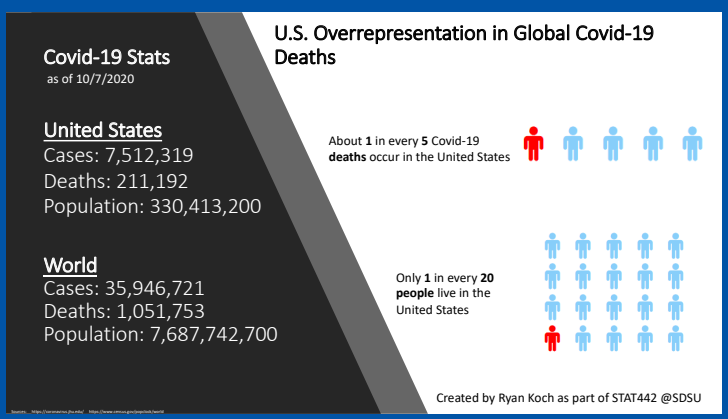
STUDENTS SHOW DEDICATION TO SCHOOL

The SDSU Counseling Office has set up sessions for people with anxiety because of the pandemic, and Strenge has made referrals there.

"I really feel for this group of students. They missed their graduation and the finish of their senior year. My empathy kicks in. I really applaud students for starting college during a pandemic. I thank them for being here and being so committed

STATISTICS STUDENTS
MAKE SENSE OF COVID-19 DATA





to their education during a pandemic," said Strenge, who works with 300 freshmen and sophomores each year.

She shared that message during the New Student Orientation sessions, which this summer were "from my home to your home," one-on-one Zoom events.

It also was stressed at a "ThumpStart" session a couple days before classes started Aug. 19 and included a panel of upperclass engineering students sharing how to be successful in college and how to get involved in campus. Another point of contact was GE 101, an introductory class required of all engineering students, which this year is part online and part in person.

Strenge taught her class period via Zoom, which also is how she handles 95% of her student appointments. Generally speaking, students like the convenience of not needing to come to her Crothers Engineering Hall office and that is particularly true of freshmen, who found that medium a way of life in spring 2020, Strenge said.

Her October and November was filled with appointments to help students with spring and fall 2021 class scheduling.

DeBates found the Zoom conversation "very helpful. I got some clarification on questions I had about different aspects of my schedule, thinking ahead to the next semester. A lot of the conversation was about how to better adjust to the pace of college. In high school, I didn't have to work that hard to keep up good grades. Having five months off instead of the two to three months made it a struggle to get back in the student mode.

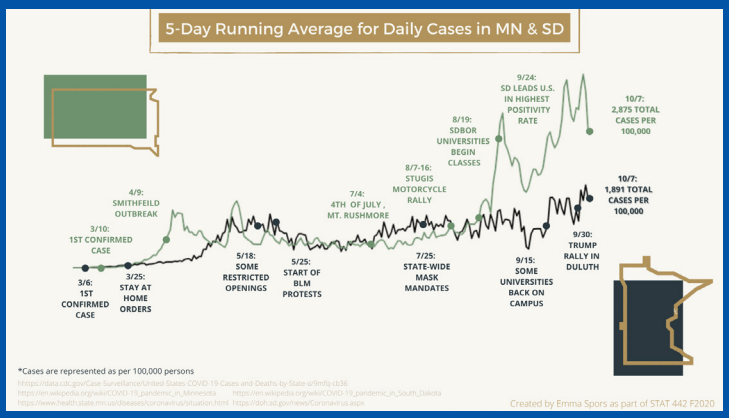
"The transition was already tough going from high school to college, this (pandemic) made it even tougher."

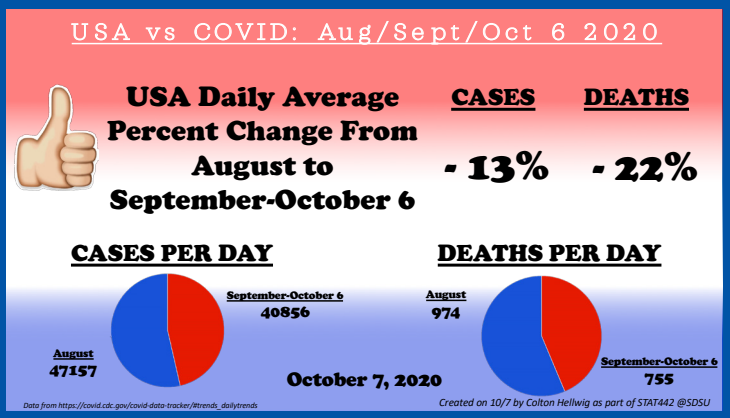
Dave Graves

With campus life a more isolated existence now, freshman mechanical engineering major Amanda DeBates has found music to be a social highlight.

Students in professor Xijin Ge's senior-level statistics class got an opportunity to analyze health care data on COVID-19. The challenge was to take real-world data from sources, such as the Centers for Disease Control and Prevention, and create graphics that make the information easy to understand.

Students examined how underlying conditions, such as diabetes and hypertension, affected mortality rates and even compared daily cases in two states to illustrate the impact of stay-at-home orders on infection rates. Others illustrated how likely different age groups were to wear masks, if required to do so.





NEW STAFF

SDSU ENGINEERING HIRES **RECRUITING COORDINATOR**

Who better to serve as the new recruiting coordinator for the Jerome J. Lohr College of Engineering at South Dakota State University than someone who comes from a long line of engineers, has experience in admissions and can relate to both computers and kids?

If those are the qualities Dean Bruce Berdanier was looking for, he found his perfect candidate in Pete Roberts, of Tea.

Roberts joined the Lohr College of Engineering right at the time that Associate Dean Rich Reid was getting ready to retire.

Berdanier noted, "Pete will build on the foundation for regional recruiting that Rich has established over the years. He will bring a lot of experience in marketing and communications along with his technical background to engage the high school students of today and help them understand the specific career opportunities they can pursue in the Lohr College of Engineering.

"Today's students are more connected than ever to technology. It's important that the Lohr College of Engineering be at the forefront in sharing the broad opportunities offered within our program—from precision agriculture to high-performance computing. Pete has the skills and knowledge to take that message to the public," Berdanier said.

A native of Garwin in central Iowa, Roberts has knowledge from degrees at Iowa State (industrial technology, 2002) and the University of Oklahoma (Master of Education, adult and higher ed, 2006).

His skills include such things as market research, data management and computer attitude—"I've learned enough Java script to be dangerous," Roberts joked.

His experience includes three years as the South Dakota School of Mines recruiter in Sioux Falls (2007-2010), a brief stay with the South Dakota Area Health Education Center and the last nine years at Augustana University as associate director of admission data and technology in its Office of Admissions (2011-2020).

"My passion for the field of engineering as well as my abilities to organize and schedule made this a very attractive position to me. My degree in industrial technology is a lot like the Lohr College of Engineering degree in operations management. My father is a software engineer, my mother is a math teacher, both my grandfathers were mechanical engineers. I have cousins and uncles who are engineers. We like to solve problems and do math," Roberts said.

He got his chance to do elementary math this spring as a home-school teacher during the COVID-19 pandemic.

Roberts and his wife, Carrie, who works with Head Start in Lincoln County, have a daughter, Sienna, 11, and twin boys, Isaiah and Samuel, 8.

In addition to keeping up with his children and occasionally playing guitar and bass, Roberts' primary avocation is athletic statistics. He has created video tutorials of software products for StatCrew, assisted with the integration of statistics software with Daktronics video board equipment at Harrisburg High School, Howard Wood Field and Sanford Pentagon, as well as serving as a statistician for events like the Summit League Basketball Tournament.

Roberts began his SDSU position June 1.

DAWKINS JOINS **MATH DEPARTMENT**

Department head Kurt Cogswell sacrificed little when he filled the secretarial position in the Department of Mathematics and Statistics.

Linda Wendt retired June 21 after 36 years in the department. On Aug. 22, Teresa Dawkins stepped in as a program assistant, bringing with her more than 32 years of experience at SDSU. She started Feb. 8, 1988, in purchasing/accounts payable; transferred to grants and contracts in September 1996, and moved out of the Administration Building in 2007 when she went to work for the Sun Grant project in October 2007.

Her new job involves processing invoices and travel reimbursements, scheduling appointments, monitoring department expenditures and preparing PARs (personnel action requests).

Of her new job, Dawkins said, "The biggest challenge will be learning the many formats of the PARs. You have civil service, nonfaculty exempt, faculty and graduate assistants."

Dawkins grew up in Volga, graduating from Sioux Valley High School and Mitchell Technical Institute. Her husband, Rodney, worked nearly 31 years (August 1987 to June 2018) in custodial services at SDSU. The Dawkins, of Brookings, have a son, Paul, of Sioux Falls.

In her free time, Dawkins enjoys cross stitching and painting.

GRANTS SPECIALIST MEREDITH RETURNS TO STATE

California native Brent Meredith has returned to SDSU for his second stint as a grants specialist, this time with Lohr College of Engineering.

Meredith served as a pre-award grants specialist in the College of Pharmacy in 2011-12. He began work in the Lohr College July 15.

In between, Meredith worked at the University of California-Irvine, initially as a cancer center grant coordinator (2013-14) and then as a senior grant coordinator for the schools of medicine and engineering (2014-20). Meredith said he and his wife were looking to move to South Dakota even before his current position opened.

When the job was listed, it seemed then the move was foreordained, Meredith said. His wife, Renata, is currently seeking a marriage and family therapy degree at Sioux Falls Seminary.

Meredith said he was one of the original grant specialists at SDSU during his first stint. "I'm thankful to the faculty and staff in those units (pharmacy, chemistry and biochemistry) because they accepted this California boy and gave me my start in the pre-award grants world."

As a grants specialist, he helps to both prepare grant applications for faculty members as well as keep an eye out for grant opportunities for them. Because the Office of Engineering Research is small (Meredith and the associate dean for research), he takes on a broad array of tasks, including sending congratulatory cards to award winners.

"It was an honor to have a hand in acknowledging our researchers," he said.

He hopes to be doing that more often. "I also firmly believe that that we will start seeing more mid-level ($200,000-$500,000) and even larger grants ($500,000-$1 million+) land in the Jerome J. Lohr College of Engineering. I think there are some researchers who are ready to take those on. It's always rewarding as an administrator to see those come in."

Meredith is a native of Long Beach, California, and earned a bachelor's degree in economics from Cal State-Dominguez Hills. He also worked two years (2006-08) as a grants officer at Cal State Long Beach.

Outside of work, the Meredithes enjoy trying different restaurants. He also is a fan of Los Angeles area sports teams and SDSU basketball. Other interests are "growing my faith and learning what it means to walk that faith out each day. I also am an armchair psychologist. I love learning about human behavior, personality theories, motivations, fears and life challenges."

RETIREES

SCHMIDT ENDS CAREER BEGUN IN 1981

After nearly 40 years of teaching at his alma mater, math professor Robert Schmidt retired in May.

His impact has been felt by countless students and colleagues.

Kurt Cogswell, head of the Department of Mathematics and Statistics, said, "Bob was an excellent teacher, extremely dedicated to ensuring his students' success. He held students to a high standard and worked hard to help students achieve that standard. He received excellent student reviews every semester, which is difficult to do in a challenging course taught by an instructor with high standards."

Schmidt simply said, "I wanted the students to understand the material when I got to the end of the class."

Charles Huth said he did more than that.

Huth is the college algebra coordinator at SDSU and holds bachelor's and master's degrees in math (2016, 2018) from SDSU, where he took three numerical analysis courses from Schmidt. Huth knew when he started the program that he wanted to become a faculty member.

Therefore, "I observed his behavior closely in an attempt to mimic his teaching style."

What Huth witnessed was "the most prepared professor I have ever seen. He also forced us to think along with him. I remember he would ask the class a question—sometimes a hard question—and he would not move or budge until someone gave him an answer. It was like a chess match.

"He would patiently wait, and we would realize that he is not going to save us with the answer. We needed to respond. It forced us to think and to be brave and try to answer his question. I love that approach and have incorporated it into my teaching style.

"I also try to be prepared before each lecture after I witnessed how impressive it is. I will never be as prepared for lectures as Dr. Schmidt was but I aspire to."

JOINED SDSU FACULTY IN 1981

Schmidt earned his bachelor's degree in math from State in 1979, went to Iowa State for a master's degree in applied math, graduated and returned to State in 1981 as a math instructor for Calculus I and II. He earned a doctorate in applied mathematics from Iowa State in 1987, the same year he became an assistant professor.

The Tripp native was promoted to associate professor in 1991 and professor in 1996.

"I enjoyed the people in the department. The vast majority of the students were good students and a lot of them performed very well."

Huth was certainly one of them.

"It was pure joy being in the classroom with him. He pushed me hard to grow and think with a little humor sprinkled in. Only people who truly care about their students can do this. My growth as a mathematician was important to him and he was open to talking to me about any math concept ... He played a huge role in my growth as a mathematics graduate student," Huth said.

INFLUENCE LIVES ON THRU OTHERS

While Schmidt's teaching style may not have changed much since 1981, the learning environment has. Most notable, of course, is the prevalence of the computer. Homework problems in many classes are done online and the grading is automatic. But there is still hand grading to do and "the worst part of the job is grading, most faculty would tell you the same.

"I enjoyed my time. I'm going to miss spending time in the office and being around people. I enjoyed being in the classroom and being around students," Schmidt said.

In his retirement, Schmidt will spend time reading, star gazing and spending time at his south Brookings home.

While no longer in the classroom, Schmidt's presence is still felt there.

Huth said, "All my professors have influenced my teaching style, but I feel Dr. Schmidt's influence is the type that most directly affects the 700 to 1,000 students I work with each semester."

Dave Graves

RETIRING WERNER LEAVES IMPACT ON MATH STUDENTS

A couple of months after retiring, instructor LeAnn Werner got a special gift—a letter from a former student.

Jayni Anderson, a senior mathematics education major from Jackson, Minnesota, wrote to wish Werner well in her retirement.

"I was so sad to hear about your retirement because you had a huge impact on my mathematical career. Calculus II is my absolute favorite class now. Some people will call me crazy for saying that, but my reply is always 'When you have a great professor, it makes all the difference.

"I know that other students had the same experience."

That encouragement can fuel a lot of hours of grading papers, something Werner would do while watching the Minnesota Twins. She has been watching the Twins (since 1961), longer than she has been grading papers (1996, full time).

"I started following the Twins when they moved to Minnesota in 1961. I think I still know the lineup for 1961. I kept score to the no-hitter by Jack Kralick in 1962," recalls Werner, who retired in May. "My dad and I managed to attend a couple games each year."

Her dad, Dale Boyd, a '41 State grad, farmed near Oldham and also had season tickets to SDSU basketball. "He started taking me to basketball games in 1960-61. We sat on the east end of The Barn." Season tickets were $16 for 16 games. The first player she remembers is Don Jacobson, the scoring great from Lake Norden.

"The best game I remember was the regional against Prairie View A&M. I kept score for that game and seem to remember Don Jacobson making 22 free throws. Attending games at SDSU in the early '60s made attending State for college a given."

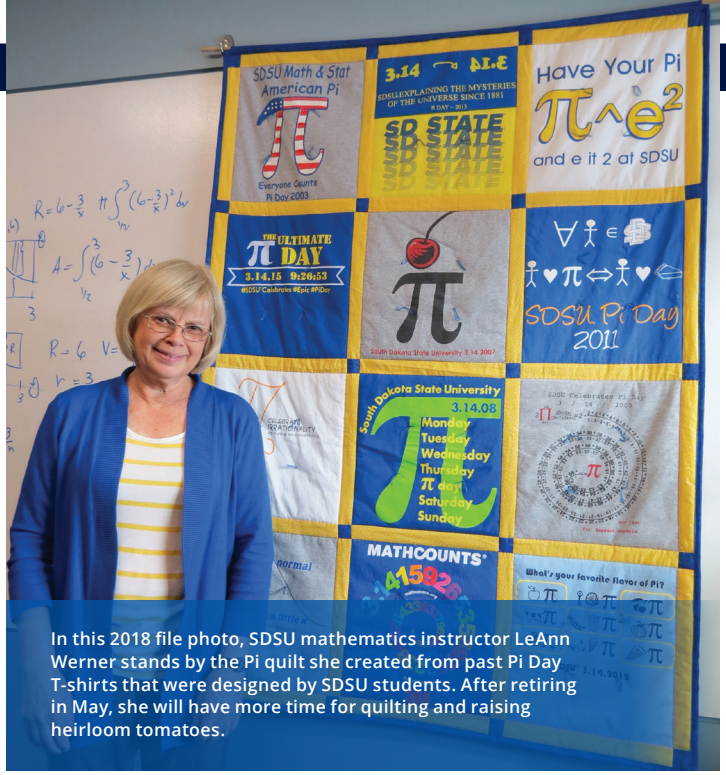
It was also at State where she would meet Hal Werner. They met while studying in the Lincoln Library reading room. They were married in summer 1970, weeks after LeAnn graduated with her math degree. In her final semester of teaching, she taught calculus in a classroom in the recently remodeled Lincoln Hall.

WERNER'S TEACHING INSPIRATION

As a student, Werner remembers taking two semesters of calculus from Maurice "Murph" Monahan, her favorite professor.

"Then over 20 years later, before starting grad school, I sat in on Calculus II and III and abstract algebra with 'Murph' to try to get back into mathematics after being a full-time mom for years. I try to teach as much like him as I can. I mentioned that I was pretty traditional in my teaching. I try to make the theory as understandable as possible, relating it to previous concepts where possible. Then I try to do as many examples as I have time for.

"I tried to make calculus understandable to everyone. I wanted them to get a good foundation in Calculus I and II for further math and engineering classes they will take. They have applications in their engineering courses so I don't spend a lot of time on applications."



In this 2018 file photo, SDSU mathematics instructor LeAnn Werner stands by the Pi quilt she created from past Pi Day T-shirts that were designed by SDSU students. After retiring in May, she will have more time for quilting and raising heirloom tomatoes.

TAUGHT TOUGHER CLASSES LATER IN CAREER

She began teaching in 1991, when she entered graduate school after their youngest child was in kindergarten. She took one class per semester and taught two sections of algebra.

At the time, college algebra was taught primarily by graduate students in a class of 35 to 40 students, not in large lecture halls like it is taught today. Werner finished grad school in 1996 and started teaching precalculus and survey of calculus. In 2001 she started teaching Calculus I and II, classes she would teach the remainder of her career.

Her husband worked as an Extension irrigation and drainage engineer and later taught in the ag bio engineering department, retiring about a dozen years ago.

COVID NUDGES WERNER TO RETIRE

LeAnn Werner said, "I'm going to miss teaching. I would say to myself, 'I'll go one more year' but with COVID I decided this was a good time to retire."

She and Hal have done a good job of social distancing during the pandemic. She helps Hal with his hobby of growing heirloom tomatoes on the family farm at Oacoma, just across the Missouri River. They have one customer—a restaurant in the Black Hills. That provides an excuse to stay at their Black Hills cabin and they have a son in Spearfish.

Their other three sons are in Las Vegas; Danville, Kentucky; and Vancouver, British Columbia. When the COVID-19 pandemic passes, they expect to be on the road.

She will travel with good memories of teaching. "I had very good students over the years. I don't know that they changed a lot. They wanted to make it through, and they worked hard."

Trips will seem shorter thinking of these words from Anderson's letter: "You're the reason I am going to be a math teacher. I would love to have the same impact on students as you did on me."

Dave Graves

GENT BECOMES NORTH CENTRAL SUN GRANT REGIONAL DIRECTOR

Assistant professor Stephen Gent was named this summer as the regional director of the North Central Sun Grant Center, based at SDSU. Gent, who has been a faculty member in the Department of Mechanical Engineering for 11 years, is the first engineering researcher to hold the position, which he began July 21.

The Sun Grant Initiative seeks to promote diversification and sustainability of agricultural and natural resource production through value-added processing developed through the five regional research centers.

As North Central regional director, Gent will facilitate university research in 10 states—Iowa, Illinois, Indiana, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Wisconsin and Wyoming. Gent replaces Vance Owens, the director since 2012.

"I am honored and humbled to have this opportunity and to work toward the continued success of the Sun Grant mission," Gent said. After earning his doctorate in mechanical engineering from Iowa State University, Gent became an assistant professor at SDSU in fall 2009 and recently was promoted to full professor.

Gent, whose expertise is in thermal fluid systems, has been principal investigator or co-principal investigator for nearly $4 million in private, state and federally funded research projects. He has worked on projects ranging from optimizing grain dryer operations to modeling blood flow through implantable cardiovascular devices as well as predictive modeling of the neutrino detectors being constructed for the Deep Underground Neutrino Experiment at the Sanford Underground Research Facility in Lead.

In June, he completed a yearlong stint as the interim associate dean for research in the Jerome J. Lohr College of Engineering. "The interim position gave me an opportunity to be immersed in the operation of a complex organization," he said.

Gent, who is originally from southeastern Iowa, grew up on a grain and hog farm. "Having spent my youth on the farm, I know how important a strong, vibrant rural and agricultural economy is," he said.

"One of the key research and development areas will be transforming resources we have in our farms and rangelands into value-added products," Gent said. "In a time when the price of fuel is $2 a gallon, one of the challenges will be to get into different markets that have high value where we do not compete against a plentiful, inexpensive commodity. If we are able to take things we now produce and sell by the ton and transform it into a high-value product to be sold by the pound, or even by the gram, that would be huge."

Vice President for Research and Economic Development Daniel Scholl said, "Dr. Gent's experience in engineering research related to agriculture, his leadership and his vision position him well to lead the regional Sun Grant Center. He brings a new perspective to developing the high-value products and value chains that will help build our agricultural and natural resource economy."

HANSEN HONORED BY HIS ALMA MATER

Tim Hansen, an assistant professor in the Department of Electrical Engineering and Computer Science, is the first recipient of the Graduate of the Last Decade Award from the Milwaukee School of Engineering.

Hansen, a 2011 graduate, says when he enrolled he knew he wanted to work with computers but never thought about what his job might look like following commencement. However, multiple internships during his undergraduate years helped steer him on a path toward academia.

He went on to earn a Ph.D. in electrical engineering from Colorado State in 2015 and is now in his sixth year at South Dakota State. In 2019, he became SDSU's first recipient of the IEEE-HKN MacDonald Outstanding Teaching Award for exceptional engagement of undergraduate students in electrical and computer engineering.

After attending a teaching institute, Hansen moved from lecture-only teaching to active teaching methods to match the 10- to 12-minute attention span of students.

"We are so very proud of Tim. His accomplishments in the few years he's been out of undergrad at MSOE are remarkable. It was an easy decision for our panel of judges to select Tim," said Cathy Varebrook, the school's director of alumni affairs and special events.

The Graduate of the Last Decade is awarded to an alumnus who has achieved significant accomplishments and received an undergraduate degree within the last 10 years.

SEO GAINS GRANT TO STUDY CROSS-LAMINATED TIMBER

Cross-laminated timber has grown substantially in popularity for use in exterior walls, floors, partition walls and roofs. However, it has not been used in highway bridges in the United States.

Now a South Dakota State University faculty member will be the first person in the U.S. to study the use of cross-laminated timber on a low-volume vehicle bridge.

Junwon Seo, an associate professor in the Department of Civil and Environmental Engineering and chair of the American Society of Civil Engineers Timber Bridges Committee, has received a $375,700 award from the U.S. Department of Agriculture's Forest Service through its Wood Innovations Grant Program. The figure includes $125,700 of in-kind contributions.

According to the Forest Service, the grant program received 103 proposals from different government and industrial agencies and academic institutions. It selected 35 projects for funding. Since 2015, this award has been the first Wood Innovations Grant awarded in South Dakota.

Seo said the success of receiving the award was based on his previous laboratory investigation funded by the Sun Grant Competitive Program, the USDA and the United States Department of Transportation through the Mountain-Plains Consortium. In the project, Seo demonstrated that cross-laminated timber can be used as structural bridge materials to resist dead loads and live loads.

Seo's plan is to design, fabricate and build a field demonstration bridge through the collaboration with various government agencies, cross-laminated timber producers and bridge engineers. Also, Seo will assess the wheel load distribution and load rating of the bridge through collaboration with a Minnesota county and monitor its moisture contents and deterioration through visual inspection for at least six months.

"CLT has great potential to promote wood products markets in bridges on low-volume roads such as rural or forest roads. These efforts will be a significant benefit that demonstrate the feasibility of the demonstration CLT bridge and that provides forefront information needed to create new standards for exterior applications of CLT," Seo noted.

Pictured: Associate Professor Junwon Seo works on the lab testing of cross-laminated timber specimen. He will conduct the first U.S. study of cross-laminated timber on low-volume bridges.

SDSU POWER SYSTEMS PROFESSOR, ALUMNUS HONORED

Reinaldo Tonkoski, an associate professor in the Department of Electrical Engineering and Computer Science, has been honored for his part with an Institute of Electrical and Electronic Engineers work group.

Tonkoski and 21 colleagues from around the world received the 2020 IEEE Power and Energy Society Working Group Recognition Award for the technical report, "Microgrid Stability Definitions, Analysis and Modeling."

The IEEE Power and Energy Society provides the world's largest forum for sharing the latest in technological developments in the electric power industry, for developing standards that guide the development and construction of equipment and systems, and for educating members of the industry and the general public.

Tonkoski and alumnus Ujjwol Tamrakar were part of a work group that produced the technical report, which was published in April 2018 and included faculty and power industry leaders from around the world. Tamraker earned his doctorate in electrical engineering in May.

The award was announced July 20 and is one of only two work group awards given by the IEEE Power and Energy Society, one for a technical report and one for a standard or guide.

The technical report developed guidelines for analyzing microgrid stability. A microgrid is a group of distributed energy resources—including renewable energy resources, energy storage systems and loads—that operate together locally to serve a certain geographic area (e.g., college campus, hospital complex, business center, neighborhood).

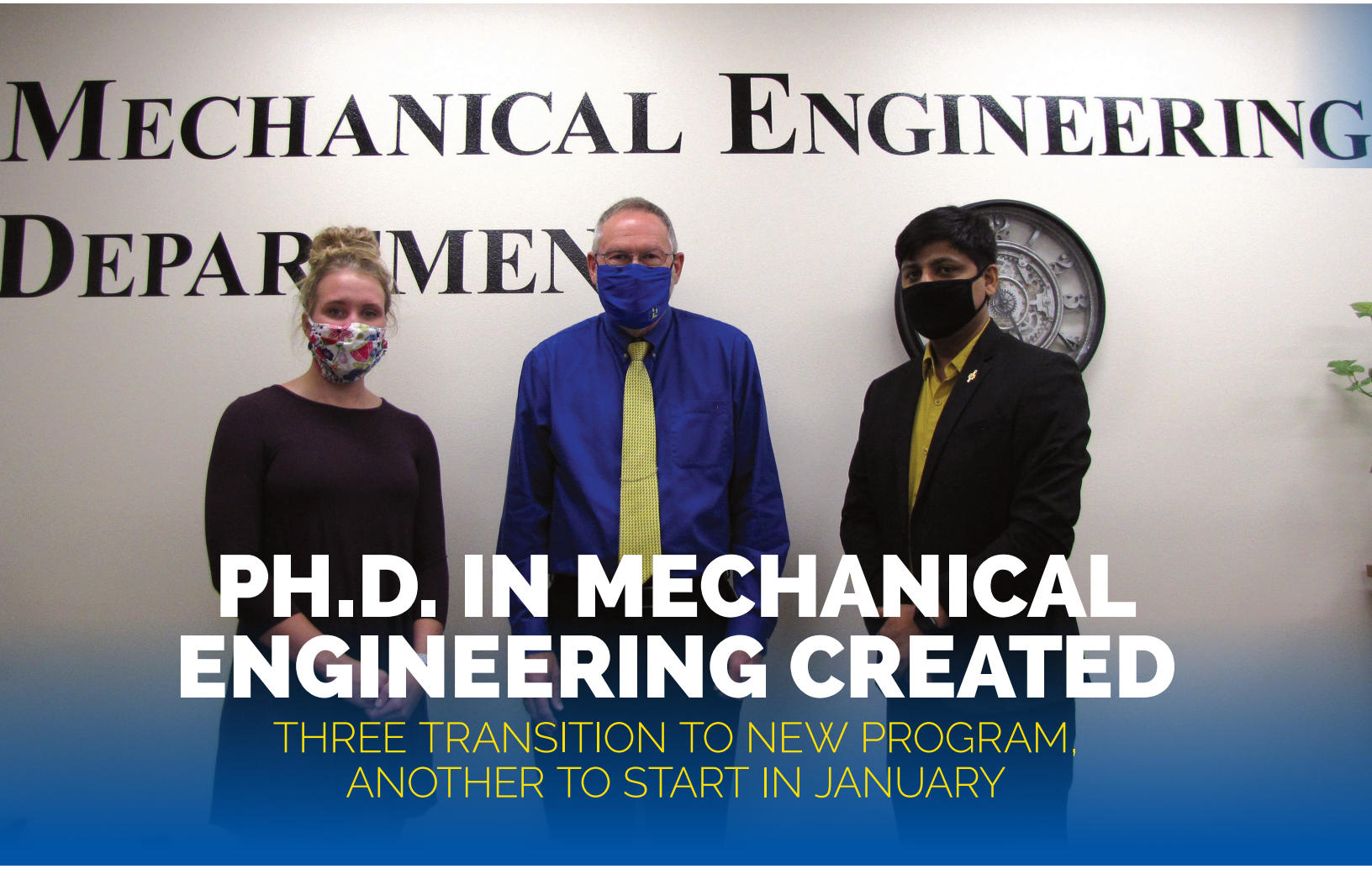
Microgrids exist in various sizes and configurations. They can be large and complex networks with various generation resources and storage units serving multiple loads or small and simple systems supplying a single customer.

Stability analysis in power systems is extremely important because it ensures the ability of the system to return to normal operation within a minimum possible time after having undergone any transience or disturbance.

Tonkoski, who is also a visiting faculty member at Sandia National Laboratories in Albuquerque, New Mexico, has been on the SDSU faculty since 2012 and has research interests in grid integration of sustainable energy in power systems, power electronics and control systems. He is also an associate editor for three major IEEE journals.

The full report can be viewed at: https://resourcecenter.ieee-pes.org/technical-publications/technical-reports/PES_TR0066_062018.html.

A webinar on the findings can be found at: https://resourcecenter.ieee-pes.org/education/webinars/PES_Ed_Web_Microgrids_070620.html.



PH.D. IN MECHANICAL ENGINEERING CREATED

THREE TRANSITION TO NEW PROGRAM, ANOTHER TO START IN JANUARY

Little recruiting was needed to launch a doctoral program in mechanical engineering that had been in the works for at least 10 years.

Earlier this year, the South Dakota Board of Regents OK'd the program, which launched with the start of fall semester Aug. 19. Department Head Kurt Bassett expects the program to grow to seven or eight students with two graduates per year, similar to the numbers at other regional universities offering the degree.

Right now, there are three students, each of whom were in the program's predecessor.

Since 2014, a doctorate has been offered in agricultural and biosystems engineering and mechanical engineering. While that doctorate served students in both programs, it was housed in the Department of Agricultural and Biosystems Engineering.

"It takes a while to get the pieces in place to support a program, such as the required number of faculty to make it happen. We needed to get additional faculty positions in place and have a sustained record of faculty success with externally funded research," Bassett said. "The combined program with ag and biosystems gave us a starting boost, and now we're able to show we can operate independently."

A number of faculty have joined the department since 2014, including all of the faculty advisers for the three current Ph.D. in ME students as well as Ashley Jorgensen, who is wrapping up her bachelor's degree this semester and will head directly to the doctoral program.

Transferring from the agricultural and biosystems engineering and mechanical engineering program are Praneel Acharya, who arrived in fall 2018; Mukesh Roy, who arrived in fall 2017; and Giovanni Lavezzi, who arrived in fall 2018.

ACHARYA WORKING TO IMPROVE SPRAYER DESIGN

Acharya, a native of Nepal, earned his bachelor's degree in aeronautical engineering in China in 2017 and was looking for an opportunity in the United States. His initial contact was professor Zhong Hu, who steered him to assistant professor Kim Nguyen. Acharya's email request was simple: "Do you think you might have an opportunity for someone like me?"

Indeed, he did and they have been working together for three years.

Acharya likes the opportunities provided in a smaller university and the opportunity to live in a smaller community. He didn't arrive on campus blind. His brother-in-law, a microbiology

Mechanical Engineering Department Head Kurt Bassett is flanked by Ashley Jorgensen, who will enter the Ph.D. program after receiving her bachelor's degree in December, and Mukesh Roy, who is slated to become the first graduate of the new program in May 2021.

graduate student, arrived in 2016 and has helped him adjust to a new educational process and a new country.

Acharya's research project has been to develop a tool to help designers of agricultural fertilizer sprayers develop a more efficient product. The tool would measure the size and speed of the spray droplets so the volume being applied to the field could be more accurately measured. He is developing the math for the tool.

"I'm trying to create algorithms that will detect how big the droplet is and how the size affects flow rate," he explains.

LAVEZZI WORKING ON SPACECRAFT GUIDANCE

Lavezzi connected with his adviser, assistant professor Marco Ciarcia, through his adviser in Italy, where he received his bachelor's degree in aerospace engineering and his master's degree in space engineering. After completing his schooling at Politecnico di Milano, he found a weak job market and an interested mentor in Ciarcia. That was in April 2018.

They continued to communicate through the spring and summer. He came to SDSU in the fall, knowing no one except his adviser.

He found the situation to be unnerving at the beginning, but also exciting since it was a new experience. Now, life in the Midwest has become normal for him. "People here are very friendly. It was a good choice at the end of the day."

Ciarcia's research—optimal and nonlinear control, and spacecraft guidance, navigation and control—proved to be a good match with Lavezzi's academic background. Currently the work has been focused on modeling and simulations, but there are plans to build a satellite three-axis rotation testbed in Ciarcia's Aerospace Robotics Testbed Lab.

The goal is to be able to use the advanced optimal attitude control strategy, developed and published in the paper "Attitude Control Strategies for an Imaging CubeSat" (2019), in order to control the rotational movements (or attitude) of a CubeSat (that is a small spacecraft), in the experimental testbed that they are going to build.

Lavezzi, who also is working as graduate teaching assistant, also is looking for further opportunities to work with Ciarcia while finishing his last two to three years of doctoral study.

ROY WORKING ON PLANT STRUCTURE

Department Head Bassett said, "The real value for our faculty is the program allows students to get involved on a research project for a longer term. By the time a master's student gets really involved or really successful on a research product, it's time to graduate. A Ph.D. student will probably be involved for three or four years, so they will have the opportunity to get deeper in research and be more productive in terms of publishing results and supporting externally sponsored works."

Roy had two papers published within six months of arrival at SDSU, but it was based on work he had done while working on his master's degree.

He earned a Master of Technology degree in mechatronics from Amity University in Noida, India, in 2016. Roy went to the internet to find out who was working on similar research. Roy's master's dissertation was the "Effect of Intracranial Pressure and Fluid Loading on the Hemodynamics of Cerebral Aneurysm."

He found a hit in Anamika Prasad, but she was in the process of transitioning to SDSU.

Prasad told Roy that if he was interested in working with her for his doctorate, he would need to be accepted to study at State. He cleared those paperwork hurdles and began working on the first of his two technical papers shortly after he arrived in fall 2017.

Those papers are "Biomechanics of Vascular Plant as Template for Engineering Design" and "Bioimpedance Analysis of Vascular Tissue and Fluid Flow in Humans and Plants."

What he basically did was incorporate his previously discerned knowledge of fluid flow in human beings and applied it to plant science. Given he was now studying at an agricultural university, it seemed like a natural transition and excellent cooperation has been received from faculty members in the plant science department, Roy said.

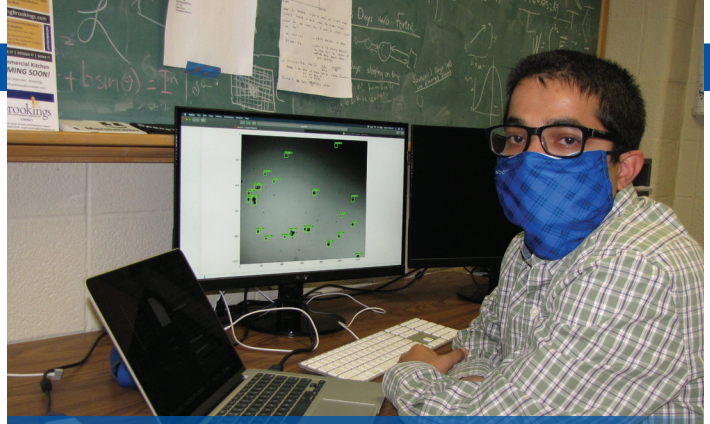
He has looked at the structural changes in sunflowers and soybeans when the crops are subjected to stress from drought, flooding and disease, he said.

ROY TO BECOME PROGRAM'S FIRST GRADUATE

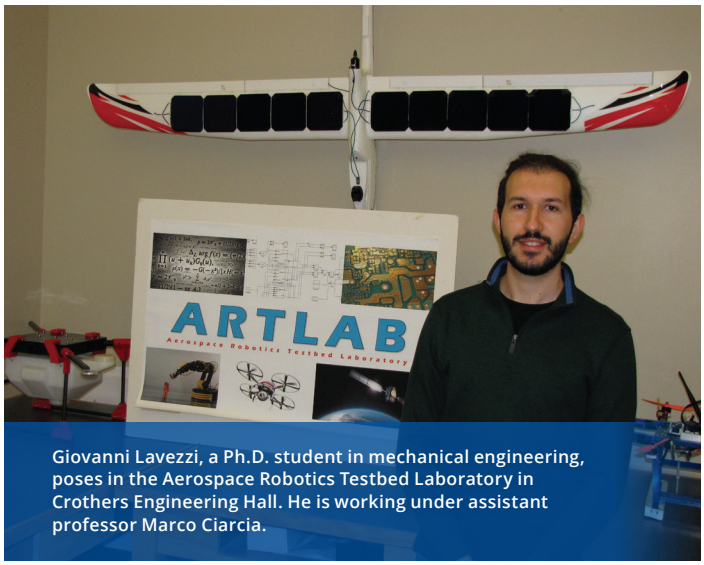
In spring 2018, his proposal to present at the Nature Conference at New York University was accepted. "One of the dreams for any researcher is who is going to accept your work? To have my work accepted for this conference was a dream-comes-true moment. It was a major conference. Would they accept my work?

"Luckily our work was very innovative, our work was strong," said Roy, who presented the work on the sunflower stem with Prasad.

Now his research is complete and he only needs to write his dissertation. Roy anticipates graduating in May 2021. He hopes to gain a postdoctoral research position in the biomedical field. He will leave SDSU as the first graduate of the Ph.D. in mechanical engineering program.



Praneel Acharya, a Ph.D. student in mechanical engineering, writes algorithms to measure droplets in fertilizer sprayers. The bordered objects on the computer screen represent the droplets.



Giovanni Lavezzi, a Ph.D. student in mechanical engineering, poses in the Aerospace Robotics Testbed Laboratory in Crothers Engineering Hall. He is working under assistant professor Marco Ciarcia.

And he is thankful for the switch. "I'm a pure mechanical engineering student. The ABME (agricultural and biosystems engineering and mechanical engineering) doesn't give an accurate picture of who I am," said Roy, noting that a doctorate from such a dual program could disqualify him from some academic positions. "I was very happy when I heard this news."

He also is happy with the support he has received from Bassett and Prasad. "My education was amazing for me."

JORGENSEN TO WORK ON FLOW DYNAMICS IN HUMANS

In comparison, Ashley Jorgensen's education is just beginning.

The Tomah, Wisconsin, native will graduate in December with a bachelor's degree in mechanical engineering and a minor in biomedical engineering. She enrolled as a pharmacy major but found her passion to be engineering after attending an intro to engineering class with a friend. "I'm super glad that I switched, and thankful for everyone who supported me in my decision." Jorgensen said.

As an undergraduate, she has done research with a couple of professors, including Prasad, who, for a time, was her adviser.

In August, assistant professor Saikut Basu sent an email that he was looking for a doctoral candidate for his biomedical respiratory project. "It was right up the alley of where I want to go in the future," Jorgensen said of the multi-institution National Science Foundation-funded research project to develop a mask with a reusable respirator that captures and kills the novel coronavirus.

Long term, she would like to do research, possibly in a hospital setting or at a university where she could also teach.

For the next four years, she will be working with Basu, who specializes in fluid dynamics in health care. That his work could easily adapt to address pressing COVID-19 concerns is "really meaningful. I was very excited to be able to continue here." This semester, her focus has been on learning computer software programs and the research process. Intensive research begins next semester.

"I have found it super interesting and it means a lot that I can do something to impact the lives of many. I feel I can continue on with that," she said of her work with Basu.

BASSETT: OPPORTUNITIES ABOUND FOR GRADS

Bassett said her enthusiasm is evidence that creating the doctorate in mechanical engineering was the right call. More evidence is found in the job market.

"As part of our proposal, we conducted research on the employment opportunities graduates can expect. One national employer survey showed a fairly substantial increase in the number of employers looking for people with advanced degrees, particularly in research and development-type work.

"There are opportunities for people to go in either the academic or industry direction. We continue to see more and more companies wanting people with advanced training and a specialization of knowledge in things such as computational fluid dynamics, finite element analysis and the advanced techniques for modeling and simulation," Bassett said.

Dean Bruce Berdanier said, "This new Ph.D. program in mechanical engineering fulfills part of the Lohr College of Engineering's strategic action plan. This is a partial fulfillment of our commitment to the university strategic plan to grow our resources supporting research. We are very excited to have accomplished this significant milestone."

Dave Graves

PH.D. IN COMPUTER SCIENCE
TO BE OFFERED IN FALL 2021

Classes begin in fall 2021 for a new doctorate in computer science program that will be offered in conjunction with Dakota State University.

The 72-credit program was approved by the South Dakota Board of Regents Oct. 7 at its meeting in Rapid City. It will be the only doctorate offered in this field in South Dakota.

Each university will offer distinct specializations and/or electives to allow students to specialize and tailor their program of study to meet their career goals as professionals in the field.

The SDSU program will emphasize expertise in areas such as precision agriculture solutions employing machine learning and data analytics. DSU will leverage its expertise with applied machine learning, analytics and information management in areas such as cybersecurity.

According to Bruce Berdanier, dean of SDSU's Jerome J. Lohr College of Engineering, plans have been in the works with Dakota State since 2018 when he and George Hamer, an associate professor and assistant department head in the Department of Electrical Engineering and Computer Science, met with administrators at Dakota State in Madison.

"That visit showed us ways on how to collaborate and work together. It was very productive. We talked about using the strengths we have in combination with the strengths they have, to develop this terminal degree," Hamer said.

"The joint program between DSU and SDSU is an excellent opportunity to collaborate, learn and share ideas between our two institutions," said Pat Engebretson, Dakota State's dean of the Beacom College of Computer and Cyber Sciences. "Both institutions have a rich history of providing educational excellence and this program will further cement that legacy. By working together, we will be able to reduce the overall cost of delivery while simultaneously increasing our capacity."

Berdanier added, "As a land-grant university, we have to have the Ph.D. programs to build research, create knowledge and develop the workforce. Similar to SDSU's new doctorate in mechanical engineering, this new degree allows SDSU to grow both faculty research and graduate research."

The universities already offer the coursework required for the doctorate. Applications will be accepted in spring 2021 for the program.

SDSU and DSU estimated they would have four students apiece in the program in 2021. Enrollment would gradually grow to 28 students apiece in 2024.

During the last five years, 11 graduates of SDSU's master's degree in computer science program have completed a Ph.D. in computer science at another institution or are in the process of working toward that degree. SDSU reports that all have stated that they would have continued their studies at SDSU if the degree was offered. Currently, three SDSU master's students are applying at other universities and would stay here if the Ph.D. program is offered.

At DSU, the master's in computer science acts as a feeder to the doctor of cyber security or doctor of information systems programs. A master's in computer science is required for the cyber Ph.D. Several MSCS graduates have gone on to these other programs as a substitution for a Ph.D. in computer science and have indicated that they would have preferred a computer science Ph.D. program, DSU officials told the regents.

NSU PARTNERING WITH SDSU IN PRE-ENGINEERING

Starting this fall, Northern State University in Aberdeen is partnering with SDSU to prepare students for a career in engineering.

The South Dakota Board of Regents approved the NSU-SDSU Guaranteed Admission Agreement June 24. Northern's new pre-engineering program guarantees that students who complete their first two years at Northern will be accepted into SDSU's engineering program.

Students can choose one of three tracks:

- pre-mechanical engineering,
- pre-civil engineering, or
- pre-agricultural and biosystems engineering.

While at Northern, students must maintain grades of at least "C" in all engineering prerequisite courses to be guaranteed transfer and ultimately graduate from SDSU with a Bachelor of Science in mechanical, civil, or agricultural and biosystems engineering.

SDSU, CAPITAL SERVICES EXPAND FELLOWSHIP PROGRAM

Capitalizing on a postgraduate fellowship, South Dakota State University graduate Ryan Burton has established himself within one of South Dakota's leading financial firms.

Burton, of Sioux Falls, serves as portfolio analytics and risk director at Capital Services in Sioux Falls, a position he has held since 2018, seven years after joining Capital in 2011. The Yankton High School graduate found it easy to walk through the doors at Capital because he was a Capital Services Fellow, which was a financial and developmental boost while obtaining his master's degree in statistics.

The number of students to have gone through the two-year program, which covers tuition and pays a stipend, has grown to 13 since beginning in 2007.

There will be more. A new three-year funding agreement between Capital Services and the SDSU Department of Mathematics and Statistics was finalized April 28. Department Head Kurt Cogswell said the agreement will provide funding to two current faculty members and three graduate students, an increase of one student and one faculty member from what had previously been financed.

Burton served as a fellow in 2012-13 before completing his master's in 2013. He earned his bachelor's degree in mathematics in 2011.

'JUMPSTARTED MY CAREER'

"The fellowship opportunity with SDSU and Capital Services jumpstarted my career, enabling me to do what I love while making significant business impacts. Applying predictive analytics techniques learned at SDSU with Capital Services' data has been a great experience," he said.

"After graduating, I've enjoyed continuing to be a part of the SDSU and Capital Services partnership helping with new internships and fellowships."

That's exactly what Cogswell hoped would happen when Capital began the program in 2007. "The money is extremely important and the professional development opportunity is terrific as well," said Cogswell, who is equally excited that the expanded program will address another facet of the department's curriculum.

The previous agreement provided funding for associate professor Tom Brandenburger and fellows in academic analytics and financial analytics. The new agreement also funds a fellow in machine learning and artificial intelligence with associate professor Cedric Neumann, an internationally recognized expert in this area, as the named scholar.

Pictured: Former Capital Services Fellows, from left, Valerie Bares, Thomas Brandenburger, Alfred Furth and Ryan Burton gather outside the firm's Sioux Falls office Oct. 23. Brandenburger also has served as faculty mentor for the past 11 years. In April, Capital expanded its fellows program to provide funding to two current faculty members and three graduate students.

'EXTREMELY INTELLIGENT AND AMBITIOUS'

Alfred Furth, the second person to get a doctorate through SDSU's statistics program and senior vice president at Capital Services, said, "We've been delighted to partner with SDSU for more than a decade in helping to develop some of the brightest minds in the Midwest. With the new agreement, we are able to increase the number of opportunities that can be provided.

"We love to see the success our Capital Services Fellows have had in their careers. The students we have funded are extremely intelligent and ambitious. The majority of their success is a result of their own hard work and dedication, but I like to think we had a small part in unlocking their talent for this discipline."

More than a little, according to Burton.

"I'm grateful that Capital Services' CEO Chuck Hendrickson and SDSU's Mathematics and Statistics Department Head Cogswell helped start the fellowship program that has helped many students early in their career. The combined mentorship from SDSU and from Capital Services during my fellowship was invaluable.

"Connecting the theoretical knowledge from SDSU with real-world applications at Capital Services provided a unique experience," Burton said.

HELP FROM ACADEMIA, INDUSTRY

Burton specifically cited help from Brandenburger, his adviser, who "spent many hours helping with both the theoretical and applied aspects of my research. Dr. Gemechis Djira, also on my thesis committee, helped with a simulation analysis to measure the potential impact of trended data.

"At Capital Services, I was mentored by my boss, Dr. Alfred Furth, James Gentile and Valerie Bares, all graduates from SDSU. Chet Wiermanski, former global chief scientist at TransUnion, was another committee member who brought additional industry expertise. Having help from industry and academia side-by-side was a great balance that led to interesting research."

Now Burton also serves as a mentor for new Capital Services fellows.

Cogswell notes that students are not obligated to work at Capital Services after completing their fellowship and oftentimes their research work is not of direct benefit to the firm.

"It's really a gracious and beneficial thing Capital has been doing for the last 13 years," he said.

NEW AGREEMENT BEGAN JUNE 22

Brandenburger, who has supervised the academic analytics and financial analytics fellows for 11 of the 13 years, said, "This program provides a valuable connection between the classroom and real-world application. Students who have participated in this fellowship program have shown substantially increased career advancement. This has been true whether or not the student stays in financial services.

"In addition to the substantial depth of experience offered by the program, the fellowship recipients also gain breadth that has allowed several to utilize these skills in industries as diverse as consulting, health care and marketing for major regional and national companies."

Neumann expects the same thing to happen in the machine learning and artificial intelligence fellowship.

"I think that it is a tremendous opportunity for our students and for local and regional businesses to work together on challenging problems that will have a positive impact on the economy of the region," Neumann said.

The agreement, which began June 22 to cover fiscal years 2021-23, is the type of partnership the university hopes to further develop with industry, Cogswell said.

"Businesses wanting these analytical capacities have a certain vision of what they want. We want to find what industry wants and prove that our students are capable of delivering that. Research undertaken by Capital Services Fellows is a great way to do that," Cogswell said.

Dave Graves

> "Connecting the theoretical knowledge from SDSU with real-world applications at Capital Services provided a unique experience."
>
> **RYAN BURTON '11/M.S. '13**
> A 2012-13 CAPITAL SERVICE FELLOW

FELLOWSHIP SERVES AS LADDER TO CAREER SUCCESS

Years spent as a Capital Services Fellow has been the springboard for 13 careers since it was begun in 2007, and a new agreement with the Sioux Falls-based financial firm will grow that number (see story on pages 16-17).

With the new agreement in place, this provides an opportunity to look back to see just how many former students were helped.

BARES NOW LEADS HEALTH SCIENCE RESEARCH

Valerie Bares, a native of Springfield and a 2005 graduate of Bon Homme High School, was a Capital Services Fellow in 2009-11. She had completed her bachelor's degree in math at SDSU (2009) and was pursuing a master's degree in statistics (2011).

"I mostly worked with Alfred Furth (senior vice president at Capital Services) and Tom Brandenburger (associate professor at SDSU) throughout my fellowship.

"There are several types of working styles and mine can be characterized best as working things out on my own and knowing I can ask for help when I'm absolutely stuck. Both Alfred and Tom were great for this since they trusted me to figure things out on my own but were always available to help and explain things.

"Alfred recognized what my skills were and led me to projects that I would both enjoy and succeed at," Bares said.

Her master's research project was "Using the Kolmogorov-Smirnov Statistic in Survival Analysis." To those not steeped in probability theory, that sounds like something found in a guide to Chernobyl. But for those who understand empirical distribution functions, it is a common way to decide if a sample comes from a population with a specific distribution.

"Ironically, survival analysis is a typical analysis done within the medical research world, but I applied it to the credit card industry and now I'm using methods I learned at Capital to apply to some areas within medical research," Bares said.

She worked for three years at Capital, which manages credit and prepaid card payment programs with partner financial institutions, before joining Sanford Research in Sioux Falls, where she now is program director and senior biostatistician.

Bares, who gained a doctorate in computational science and statistics from SDSU in 2017, said, "The Capital fellowship was my first experience in the workforce. I did meaningful work and was trusted. I really learned to think outside the box and look for innovative ways to apply what I knew."

KRUEGER RISES QUICKLY TO VP WITH WORKING CAPITAL FIRM

Ed Krueger, a native of Delano, Minnesota, served as a Capital Services Fellow between gaining his bachelor's degree in mathematics from SDSU in 2012 and his master's in statistics from SDSU in 2014.

Today he is vice president of risk analytics and decision sciences at Channel Partners Capital in Minnetonka, Minnesota, a nationwide provider of working capital for small businesses.

Krueger said, "Often, new analysts take years to train to the level I was when I left school. To do this effectively, you need people like Alfred and Tom providing the right type of guidance—from a place of expert knowledge and experience.

"Being able to collaborate with other students who are in the program also helps this. When I was in my second year, there was a lot of knowledge I was able to pass along to the next fellow and so on. The level of exposure to classroom and real-world examples became the exact right combination.

"Without the fellowship—had I simply completed a few internships and worked on my classroom work—I could have ended up in the same position I am today. However, I think it would have taken three to five years longer. I was able to leave college and start as a senior analyst.

"Within two years, I was senior manager of credit risk. To get to the senior manager role without the fellowship would have been a longer road."

Krueger, now of Jordan, Minnesota, earned an MBA from the University of South Dakota in 2018. He added, "Since I've left SDSU, I've hired several graduates in the roles I've had at Bluestem Brands and United Healthcare. I've helped a number of others get jobs up in the Twin Cities area.

"As our network continues to grow in this area, we are starting to see quite a presence coming from SDSU's program—and the fellowship with Capital."

He summarized, "Without (the fellowship), I know my path to the career I have today would have been longer and tougher."

CAPITAL SERVICES

THE CAPITAL 13

SDSU students who served as Capital Services fellows, the years they were a fellow, their current position:

- Thomas Brandenburger, 2007-09, associate professor, SDSU
- Alfred Furth, 2007-09, senior vice president at Capital Services
- Rabeka Omdahl, 2008-09, business analysis consultant, UnitedHealth Group
- Valerie Bares, 2009-11, program director and senior biostatistician at Sanford Research
- John Baumgardner (Academic Analytics Fellow) 2012-2013, consultant sales analytics, The Hershey Company
- Ryan Burton, 2012-13, portfolio analytics and risk director at Capital Services
- Ed Krueger, 2012-14, vice president of risk analytics and decision sciences at Channel Partners Capital
- Ally Pelletier (Academic Analytics Fellow) 2013-15, data scientist, Polaris
- Garrett Schiltgen, 2013-15, data scientist – senior consultant, Deloitte Consulting
- Daniel Vellek, 2015, senior manager credit compliance, Bluestem Brands
- Landon Thompson, 2017-18, senior data scientist at UnitedHealth Group
- Eric Stratman (Academic Analytics Fellow) 2017-18, web analytics consultant at Dunn Solutions Group
- Sebastian Sowada, 2018-19, compliance decision sciences manager, Bluestem Brands

Note: Brandenburger also has served as faculty mentor for the past 11 years.

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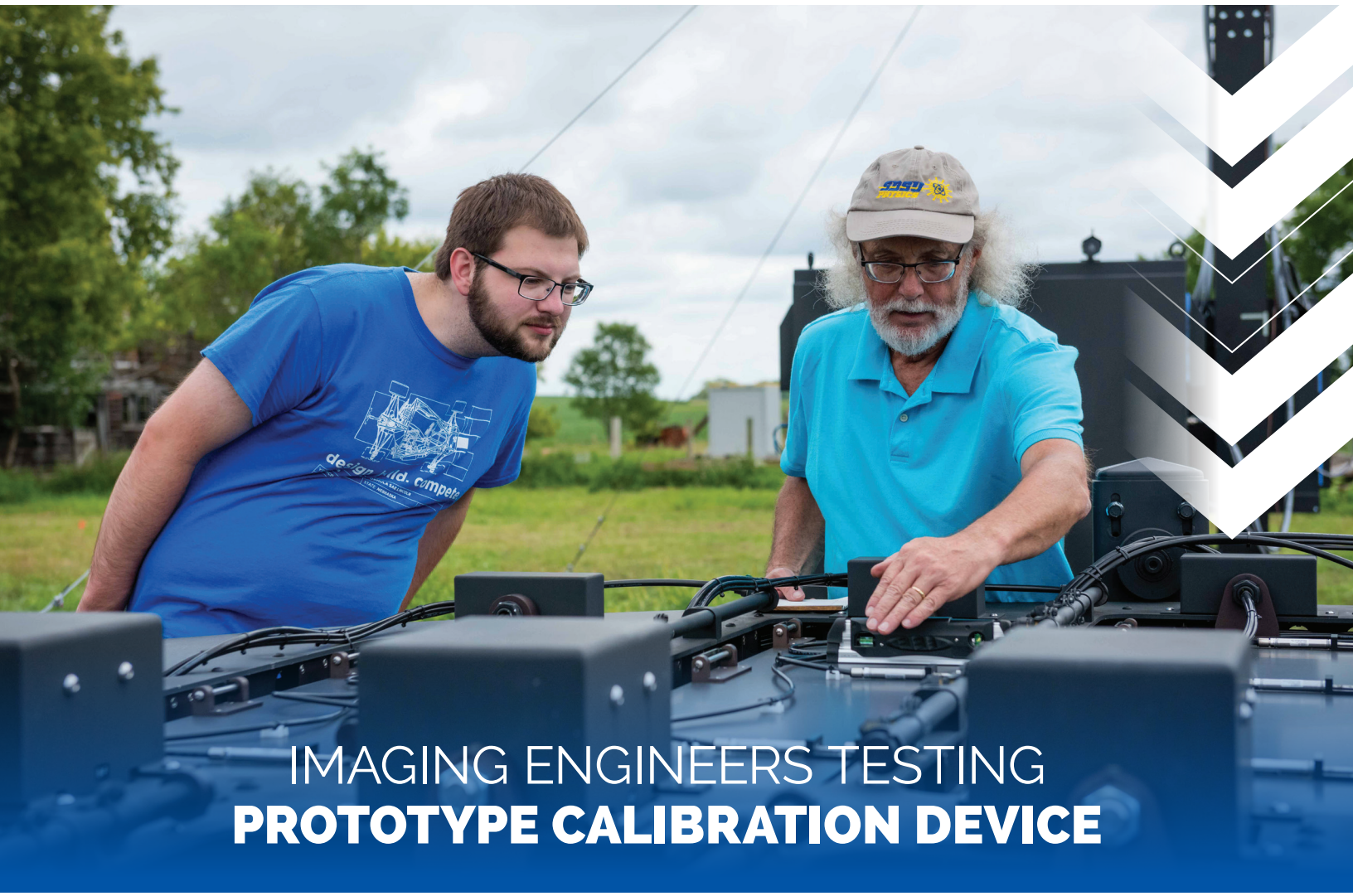


IMAGING ENGINEERS TESTING **PROTOTYPE CALIBRATION DEVICE**

Imaging engineers at South Dakota State University are testing a prototype device that may soon be used to calibrate sensors on Earth-imaging satellites, according to Larry Leigh, director of the SDSU Image Processing Laboratory. The partnership with Labsphere, a New Hampshire-based electro-optics company, will also help Leigh and his team conduct research to validate new remote sensing products.

"It's a two-way street," Leigh said. "Labsphere wants our opinion about its hardware, which also allows us to pursue some new research areas." Labsphere is a global provider of systems, materials and services for photometry and radiometry applications including remote sensing, light metrology, image sensor characterization and spectroscopy.

The Field Line-of-Sight Automated Radiance Exposure, or FLARE, system uses convex mirrors to redirect the sun's rays toward satellite sensors and take radiometric measurements. The goal is to offer clients a cost-effective means of calibrating optical sensors on unmanned aerial vehicles, airborne manned aircraft and orbiting satellites.

"The company has an approach that is unproven," Leigh explained. "The science says it works; the algorithm says it works, but they have to put an instrument in the field to make sure they can achieve results the industry can get behind."

The SDSU Image Processing Laboratory is one of only three university laboratories in the nation doing radiometric satellite calibration.

Signals from satellite sensors produce digital images composed of pixels. Each pixel measures the amount of energy reflected or emitted from Earth, Leigh explained. Before a satellite is launched, the sensors are calibrated; however, while in orbit, the sensors can drift or change.

Imaging engineers take measurements when the satellite passes over a specific location and run those measurements through an atmospheric model to predict what the satellite sensors see. Based on those readings, engineers adjust, or calibrate, the sensors.

VALIDATING FLARE CALIBRATION

The FLARE system arrived in the latter part of June via a semitrailer and was installed within a few days at the site 3 miles north of Arlington. The FLARE system is 16 feet in diameter and sits upon a 20-foot-diameter concrete slab. A tower with additional instrumentation stands near the device.

The deployment site is strategically located along the path of Landsat 8 and the Sentinel 2 satellites, so the researchers can

collect data every eight days—provided there are no clouds obscuring the sun.

"This is an alpha product," Leigh said, noting the company is working to reduce the device's size to increase its mobility. To do the testing, Leigh is working with Chris Durell, Labsphere's business development director for remote sensing.

"FLARE is a next-generation tool for satellite and airborne imager calibration" Durell said. "It will automate and improve the process of Earth remote sensing and lead to digital imager calibration becoming more accurate, easier and less expensive by several factors."

Furthermore, Durell continued, "Better calibration means getting more insightful data from every sensor image. Calibrated images mean better climate science, weather prediction, agricultural mapping and other vital, beneficial information."

When a system in the FLARE network is tasked by the customer through the cloud portal, the rectangular panels flip to reveal the mirrors and the platform rotates to focus the sun's light toward the satellite. The process takes only a few mouse clicks and minutes versus the hours and days needed today through classic means, Durell added.

To validate the instrument, Labsphere runs FLARE reflectance measurements "through its algorithm to provide a solid calibration factor," Leigh explained. Meanwhile, the SDSU imaging engineers take measurements using "the traditional method we've been using for 20 years to see if we come up with the same answer."

Leigh anticipates the testing will take at least 18 months, but the partnership may continue longer than that.

CALIBRATING NEW SURFACE PRODUCTS

Access to the FLARE hardware will help Leigh and his group determine how to validate ground-level reflectance data.

Traditionally, satellite sensors are calibrated based on top-of-the-atmosphere reflectance; however, demand is increasing for products that use ground-level reflectance. For instance, these products can help farmers evaluate the health of a corn crop or identify areas affected by disease, Leigh explained.

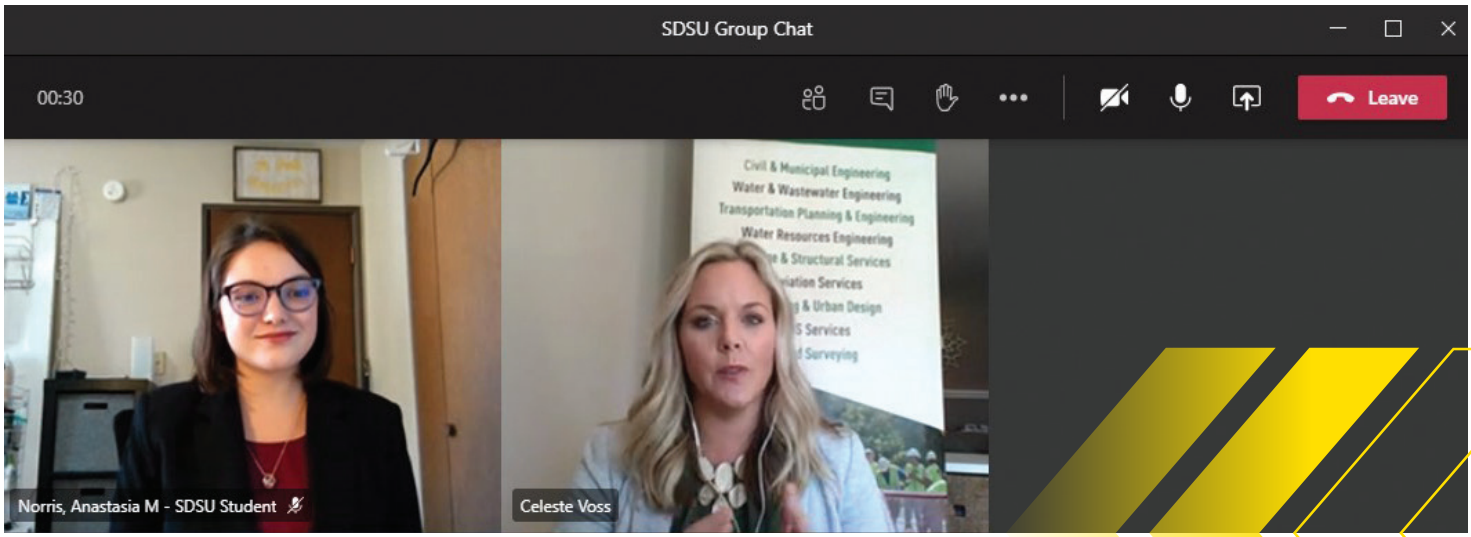
"It's a new area when it comes to satellite sensors," he said. The Europeans and Australians are trying to figure it out and Rochester Institute of Technology, the University of Arizona and the SDSU calibration groups are coming up with the American approach to ground reflectance validation.

"We want to know how well the sensors and algorithms are doing that," said Leigh, noting lab clients, such the U.S. Geological Survey, are interested in utilizing this capability. "That will open new potential avenues for calibration and validation of another level of products that the industry wants."

Christie Delfanian

Left: Junior electrical engineering major Chase Pinkert and imaging engineer David Aaron evaluate the critical alignment of the FLARE system and confirm the system is within the tolerances needed to direct a beam of sunlight to intersect with the satellite.

Below: SDSU Image Processing Lab Director Larry Leigh and research associate Pedro Oliveira discuss the functionality of the FLARE system, which uses convex mirrors to redirect the sun's rays toward satellite sensors (Photos taken July 22).



VIRTUAL JOB FAIR GAINS COLLECTIVE 'LIKE'

Plans were set for Jerome J. Lohr College of Engineering to hold an in-person career fair off campus in Brookings Oct. 1—a rare live event in these pandemic days.

However, as community spread grew, the college needed to follow university protocols and switch to a virtual format. The result was better than many expected.

The date was moved to Oct. 13 and the platform Handshake was used. Becky Pistulka, event coordinator for the college, reports 385 students and 81 employers participated. While numbers were down from the record 148 recruiters from 16 states and roughly 500 students in 2019, the 2020 showing was only a small drop from those registered to attend the proposed in-person session this year, Pistulka said.

"I actually talked to several students who said they liked the virtual format better. It was 10 minutes of uninterrupted time with a recruiter. They didn't feel rushed and anxious like when several other students were lining up behind them in the physical fair. Several recruiters that I spoke with liked it as well," she said.

Organizations could participate without charge and host a maximum of three 30-minute group sessions to introduce themselves to students. In turn, students could sign up for 10-minute individual sessions with the entities. Each organization could have up to 15 recruiters for the one-on-one sessions.

Abby Nelson, an engineer with HDR Engineering in Sioux Falls, told Pistulka, "I thought the virtual career fair went very well. I was pleased that most of our 10-minute spots filled up so we did not have very many breaks. Overall, the students were on time and prepared. The Handshake technology worked very smoothly, and we had some good conversations."

Anatasia Norris, a civil engineering major, told KELO TV in Sioux Falls, "'I got the chance to hear everything about this company. I wasn't rushed. There wasn't a line of five people behind me waiting to talk as well. I had time to explain myself and learn, and I got a lot more interaction.'"

The Oct. 17 report also quoted Danelle Svare, ag business recruiter with Land O'Lakes for the upper Midwest and eastern region. "We talked with over 80 students in a four-hour time period, which is really good if you think about that virtually. It includes our one-on-one sessions and the group session."

As for the spring career fair, current plans are for that to be virtual as well. It will be Feb. 11, 2021.

The SDSU Office of Career Development assisted with logistics, including following up with recruiters.

Dave Graves

KNABACH AWARD

FORMER SDSU PROF ROPP CITED FOR EXCELLENCE IN POWER

Eleven years after his mentor was honored, former South Dakota State University associate professor Mike Ropp received the Wayne E. Knabach Excellence in Power Award.

It was presented at the South Dakota Regional Power Conference, which this year was a virtual event held Oct. 5.

Ropp taught in the electrical engineering department for 11 years, owned his own Brookings-based power technology business for 10 years and since November 2019 has been a principal member of the technical staff at Sandia National Laboratories in Albuquerque, New Mexico. He was developing patented technologies even as a Georgia Tech graduate student.

Steve Hietpas, director of Center for Power Systems Studies, which organizes the conference, said the research contributions Ropp has made in the last 25 years make him "a leader within the electric industry."

MENTORED BY KNABACH

When Ropp joined the faculty in January 1999, Knabach had been retired from the department for four years, but directed the Center for Power Systems Studies until 1997 and continued to keep in touch with the faculty. He received a lifetime achievement award from the center in 2009.

"I may have been the last new faculty member to have been mentored by Wayne," said Ropp, who grew up in Scottsbluff, Nebraska, and went to Georgia Tech for his master's and doctorate in electrical engineering (1996 and 1998, respectively). It was an informal mentoring relationship that turned into a friendship through the years, Ropp said.

"Sometimes I would call him, sometimes he would just show up in my office unannounced. I talked to him a lot about student advising" as Knabach was well-known for the relationships he built with students. "Wayne was such a gentle person, but also knew his stuff. He loved to talk about hair-brained ideas, but he also would bring it back to the practical," Ropp said.

MENTORED BY KURTENBACH

Another of Ropp's mentors is former electrical engineering faculty member and Daktronics co-founder Aelred Kurtenbach.

His advice came into play when Ropp decided to leave the university to form Northern Plains Power Technologies in March 2009. The business, which Ropp operated until taking the post at Sandia, quickly developed a niche in new technologies for integrating independent power systems into the national electrical grid.

Kurtenbach, who taught at SDSU in 1962-65 and 1968-73 before creating Daktronics, told Ropp, "'If South Dakota State really does want economic development, we can't just graduate students. We have to graduate faculty that go out and establish these businesses,'" Ropp shared.

In addition to wanting to put his personal and professional knowledge to work in the private sector, Ropp also saw Northern Plains Power Technologies as a lever for economic development.

At its peak, the company had 10 employees, mostly former State students, and was doing business coast to coast as well as in Mexico, Canada and the Caribbean, he said.

A BUSINESS OWNER'S CHALLENGE

Another secret Kurtenbach shared with the budding entrepreneur was "you have to run fast. You have to be willing to take a risk," Ropp said.

"I applied for (and received) a couple grants and that was a part of where things got started. I was begging for work wherever we could get it, pounding the pavement and there were a lot of nights where I didn't sleep very well. I learned on a daily basis what I didn't know," he said.

Ropp explained running a business can be like playing a game of cards: there are skill elements involved and you have a partner to help out, "but there are all kinds of things that can happen that you can't control. There is no way to make that risk disappear. Markets can change. Legislation can change the landscape.

"Running a business absolutely gave me an appreciation for the needs of business and industry; not living in the ivory tower is a good thing. Business has to operate on a shorter time frame. I was responsible for paying the salaries of 10 people. I couldn't afford to examine an aimless path.

"Also, I wanted Northern Plains Power Technologies to be a place where engineers wanted to work. (Comic strip) Dilbert is nonfiction in many companies. I wanted to create a really great place to work.

"We were able to be on the front lines for a number of issues. It helped me be able to see what was coming up (in terms of new technology). At the end of 10 years, Northern Plains Power Technologies was doing very well."

But at the end of 10 years, the timing also was right, personally and professionally, for Ropp to join the Sandia National Laboratory, which he had worked for as a subcontractor for many years. Ropp closed his business and worked remotely from Brookings while his twins finished high school. The family moved to Albuquerque July 11, but because of the COVID-19 pandemic, he has continued to primarily work from home.

Ropp's role as technical researcher is to find "new and better ways to do things," particularly in the area of power electronics.

Dave Graves

ASCE CHAPTER NAMED TOP IN REGION

For the first time since 2011, the student chapter of the American Society of Civil Engineers at South Dakota State University was named the top chapter in the region.

There are 23 chapters in the region, which stretches from Colorado to Missouri and South Dakota to Kansas, according to Zach Gutzmer, a faculty member in the Jerome J. Lohr College of Engineering and club adviser for the past nine years. There are nine regions within the United States.

Chapters are judged based on annual reports, which are submitted to the national ASCE office. The reports covered spring and fall semesters 2019.

Chapter president Taylor Fauth said, "The success of SDSU's ASCE student chapter can be attributed directly to its members.

"Our chapter is full of dedicated students who work hard year-round to make sure that ASCE is continually the best it can be at SDSU. We have students who are involved at all levels of their college careers, from freshmen in their first week on campus up to graduate students and even faculty and professional involvement.

"All our student competition teams, including concrete canoe, steel bridge, GeoWall and Mead presentation, are extremely accomplished, placing high in regional and even national competitions many times over the past several years. These teams are an integral part of our chapter, giving our students a chance for hands-on learning outside of the classroom as well as a fun way to work with each other.

"Our student chapter also owes a lot of its success to our faculty adviser, Zach Gutzmer, who was recognized in his own right this year as ASCE's Region 7 Outstanding Faculty Adviser. I am very proud of SDSU ASCE, and I know that our student chapter will continue to shine in the years to come."

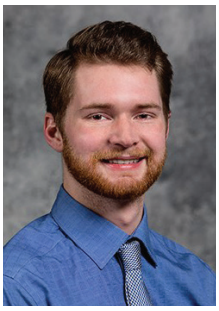
Fauth, of Leola, was one of five senior officers in the club in 2019. She was joined by Selene Renes, Harrisburg, vice president and compiler of the annual report; Nathan Powell, Chamberlain, recording secretary; Kaitlyn Hague, Highmore, canoe captain; and Tyler Tetrault, Lakeville, Minnesota, bridge captain.

Gutzmer said, "This is a student-led group, and our strength is our students. We have had strong student officers and very active student members that push the student chapter to achieve its goals. This award belongs to the students. As adviser, I am happy to see all of their hard work recognized and rewarded."

With 120 members, ASCE is one of the largest in the college.

Members of the 2019 concrete canoe team pose by their contest entry at Iowa City, Iowa. For its participation in such skill activities as well as performing community service, the American Society of Civil Engineers at South Dakota State University has been named the top school in its region.

LEADERSHIP LEADS THE WAY



Joseph Eickman

Evan Steers

Matt Stoel

The top three officers in the SDSU chapter of Tau Beta Pi each earned $2,000 scholarships through the national organization.

Selected along with 279 other engineering honor students from throughout the United States were senior mechanical engineering majors Joseph Eickman, chapter vice president; Evan Steers, president; and Matt Stoel, treasurer.

Tau Beta Pi is the only engineering honor society representing the entire engineering profession and the nation's second-oldest honor society, founded at Lehigh University in 1885. The scholarships are awarded on the competitive criteria of high scholarship, campus leadership and service and promise of future contributions to the engineering profession.

The SDSU selections:

Eickman — The son of Mark and Beth Eickman of Salem, he is a 2017 graduate of McCook Central High School. Eickman plans to graduate from SDSU in December 2021 and then pursue graduate school with the aim of landing a job at NASA. He carries a 4.0 GPA and also is involved in intramural sports.

Steers — The son of Bob and Diane Steers of Miller, he is a 2017 graduate of Miller High School. Steers plans to graduate from SDSU in May 2021 and then pursue a master's degree in mechanical engineering from SDSU. He carries a 3.9 GPA and also is involved in Pi Tau Sigma.

Stoel — The son of Leon and Tammy Stoel of Sioux Falls, he is a 2017 graduate of Sioux Falls Washington High School. Stoel plans to graduate from SDSU in May 2021 and then work as a substation engineer for Ulteig Engineers in Sioux Falls. He carries a 4.0 GPA and is president of the campus chapter of the Institute of Electrical and Electronics Engineers and is involved in the Navigators campus ministry.

ENGINEERING STUDENTS REBOUND FOR VIRTUAL CONTEST

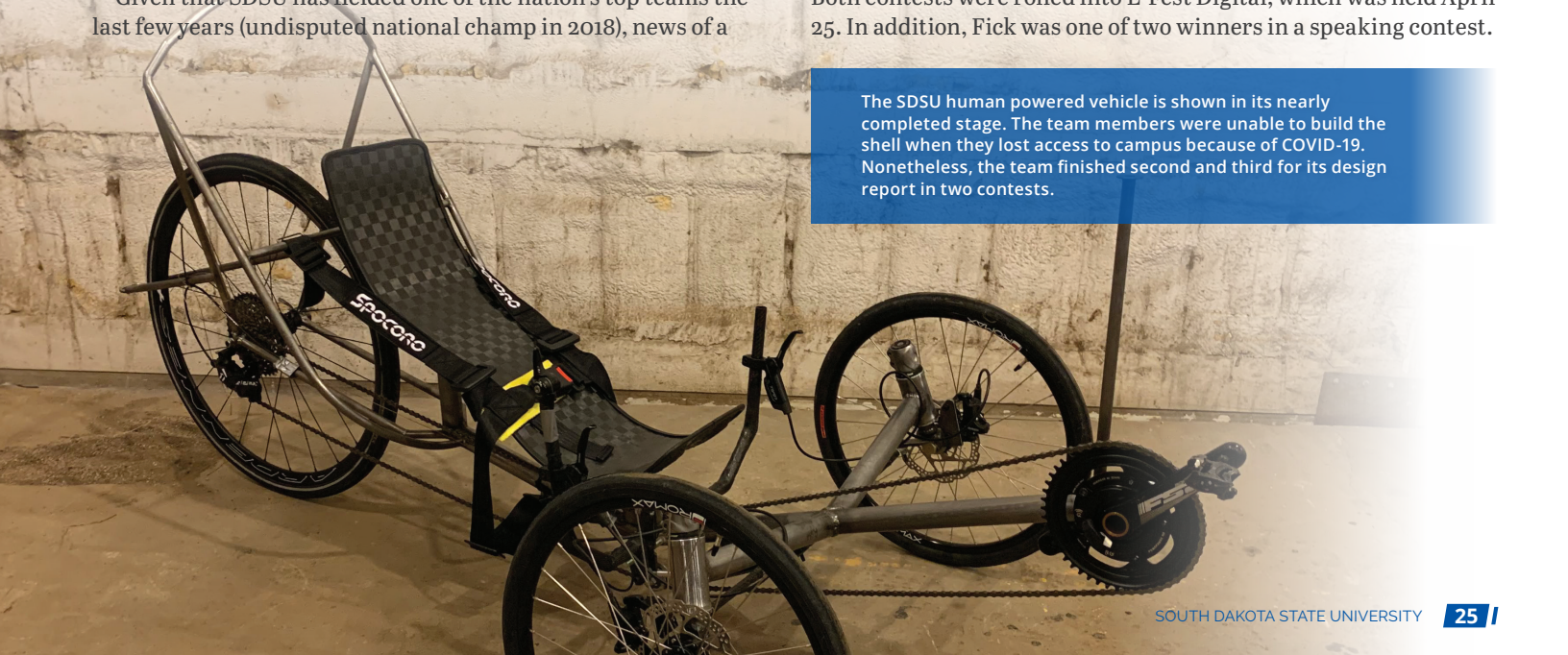
Disappointment was only a temporary setback for a group of South Dakota State University students hoping to place high in an engineering contest.

SDSU already had a team of 18 students signed up to compete in human-powered vehicle contests in East Lansing, Michigan, and Perry, Georgia, in April when the COVID-19 pandemic arrived and put an end to public gatherings as well as in-person teaching. The contests, sponsored by the American Society of Medical Engineers, became a digital event.

Given that SDSU has fielded one of the nation's top teams the last few years (undisputed national champ in 2018), news of a canceled event was crushing, said 2020 team captain Evan Fick, of Garretson.

But with some encouragement from their adviser, Greg Michna, an associate professor in the mechanical engineering department, the team worked through that disappointment and presented one of the top design reports, according to Fick, a team member for all four of his years at State.

SDSU finished second in the E-Fest South contest against 20 schools and third in the E-Fest North contest against 40 schools. Both contests were rolled into E-Fest Digital, which was held April 25. In addition, Fick was one of two winners in a speaking contest.



The SDSU human powered vehicle is shown in its nearly completed stage. The team members were unable to build the shell when they lost access to campus because of COVID-19. Nonetheless, the team finished second and third for its design report in two contests.

SDSU STUDENT CHOSEN FOR **FELLOWSHIP BY PRECAST INSTITUTE**

What if damaged precast concrete bridge columns and building beams or columns could be replaced instead of having to demolish the structure?

That is the possibility a South Dakota State University graduate student and his adviser are looking at. Kallan Hart is a first-year graduate student from Faribault, Minnesota, who earned his bachelor's in civil engineering in 2019. Mostafa Tazarv is an assistant professor in the Department of Civil and Environmental Engineering within the Jerome J. Lohr College of Engineering.

Work has just begun on the project, which is largely being funded by an award from the Precast/Prestressed Concrete Institute. Hart received the $40,000 Dennis Mertz Bridge Research Fellowship for 2020-21 and became the first SDSU student to receive an award from the institute. It is to cover his tuition, fees and living expenses as well as project costs.

Supplemental funds come from the National Center for Transportation Infrastructure Durability and Life Extension.

They will undertake a two-year study within the Lohr Structures Lab on campus in cooperation with industry partner Gage Brothers Concrete, Sioux Falls.

Tazarv explained steel bars are traditionally embedded within the columns or beams of a concrete structure. However, when a catastrophic event, such an earthquake, hits the structures, those bars often yield, and sometimes buckle or fracture. When the damage is extensive, the entire structure must be demolished, he explained. Hart and Tazarv will experiment placing the bars on the outside of the bridge columns, which are the main source of resistance against earthquakes and other extreme events.

Their theory is that those bars could be replaced while leaving the structure in place and saving millions of dollars as a result.

In initial testing in the Lohr Structures lab, Tazarv said "the proposed repairable precast connections were investigated through cyclic testing of four half-scale beam-column specimens detailed based on a nine-story building designed for Los Angeles, which is a high seismic region. A reference cast-in-place beam-column specimen was also included for comparison.

The test results showed the repairable precast connections can withstand more than 14 times the design level earthquake with insignificant damage and ability to be repaired afterward."

Furthermore, Tazarv found precast buildings using the repairable technology can withstand extreme earthquakes with minimal damage and repair needed. Now, it is the time to test the idea on bridges.

In the next two years, Hart will develop 10 new repairable details for bridge columns, rank them based on constructability, cost and expected performance, and test the top two repairable columns, each 10 feet tall, to failure.

Hart is excited to begin the research and be selected for the award.

"Assisting on work in the lab the past few months has given me new insight into the seismic applications of structural engineering. Hopefully, our new detailing will provide transportation departments an additional design option to reduce replacement costs in the event of an earthquake while also cutting the amount of time that bridges will have to be closed," Hart said.

Dave Graves

Graduate students Kallan Hart, left, and Theodore Sjurseth check for cracks on a concrete column being tested earlier this fall in the Lohr Structures Lab on the South Dakota State University campus. Hart received a $40,000 grant from the Precast/Prestressed Concrete Institute to further the research, specifically looking at bridge columns.

VISION FOR BETTER CPR MODEL PAYS OFF

Physiology faculty member Mark Messerli had an idea for a better model to teach heart anatomy and CPR.

To bring it to life, so to speak, the assistant professor sought help in-house. He turned to Todd Letcher, an associate professor in mechanical engineering, who had just the students for him. Senior mechanical engineering majors Craig Jibben, Brooklyn VanDerWolde and Katelyn Hillson combined to build a prize-winning visual CPR simulator.

Their plans won the 13th annual Idea Competition sponsored by the Brookings Economic Development Corp. in February and then finished second in the Governor's Giant Vision contest April 21.

The students started the project early in fall semester 2019 as their senior capstone and soon decided to follow Letcher's recommendation they prepare their effort for the Idea Competition. Encouraged by that victory, it was a natural to take their entry to the next level. That was slated to be an in-person presentation April 21 in Rapid City.

But the COVID-19 pandemic turned that into a Zoom presentation and also prevented the trio from completing its life-sized prototype.

FINAL ASSEMBLY LEFT UNDONE

"It's about 85 to 90% done, but it's not assembled," Jibben said in a May 1 Zoom interview. SDSU students headed for spring break March 6 and a week later learned spring break would be extended a week as COVID-19 cases began to show up in South Dakota. By March 23, all classes were online and access to campus buildings restricted.

VanDerWolde said, "We couldn't get final assembly together because we needed things from the machine shop on campus."

For the Giant Vision contest, the students made a 10-minute PowerPoint presentation with another five minutes allotted for questions. The PowerPoint offered 3D models and pictures of finished components, and explained the design process, the expected cost of production, and the projected sales price and potential markets.

With a projected selling price of $1,200 and estimated production cost of $250, manufacturers should have an interest in the simulator.

Those next steps are being taken this fall by a follow-up group. Jibben said, "We would have all liked to finish it but with campus being closed through the end of the summer, it was hard to finish."

The new group is on schedule to do so, Letcher said. "It's a really interesting project between a couple of very different departments on campus. And, hopefully, something that will be commercializable, too," he said.

NEXT STEPS

This fall, Jibben and VanDerWolde are at the University of South Dakota taking another year of undergraduate classes before pursuing medical school. Hillson will graduate in December and then is looking at a biomedical engineering graduate school program. All have taken classes in SDSU's biomedical engineering program.

Team members, from left, Katelyn Hillson, Craig Jibben and Brooklyn VanDerWolde pose at the Research Park at South Dakota State University, where they won the Brookings business plan competition in February. The mechanical engineering seniors finished second in the Governor's Giant Vision contest April 21.

The trio has several reasons to be thankful for the confidence placed in them. One of them is the $4,000 prize from the Governor's Giant Vision contest. That money may be used to begin the patent process or it may be forwarded to the next group, VanDerWolde said. Jibben added, "If we had a patent, we could talk to biomedical companies and sell the patent."

The final step of assembling a prototype also is necessary before approaching biomedical companies, he said.

Dave Graves

SDSU PACES GIANT VISION CONTEST

The 2020 version of the Governor's Giant Vision produced a strong showing by SDSU.

Eight teams from State applied for the student business plan competition with five being selected as top 10 finalists. Two teams of mechanical engineering students took home prize money. Finishing second and winning $4,000 were SDSU students Brooklyn VanDerWolde, Sioux Falls; Craig Jibben, Brookings; and Katelyn Hillson, Austin, Minnesota, with their visual CPR simulator. (See separate story.)

Placing fifth and winning $1,000 were Evan Fick, Garretson; Caleb Bray, Farmington, Minnesota; and Anna Fasen, Monticello, Minnesota. Their product, the Talaria Running Form Trainer, is a force-sensitive running shoe insert designed to reduce the incidence of lower-body running injuries by helping runners of all experience levels improve their running form.

Teams placing six through 10 each received $500.

BEST OF BOTH WORLDS

ME MAJOR MINGO JUMPS AT CHANCE TO COMPETE

When Madison "Maddie" Mingo graduated from Marian High School, Omaha, Nebraska, with the school record in the high jump, she planned to take that skill to South Dakota State University while at the same time study mechanical engineering.

The senior has succeeded in both. She holds a 3.74 GPA, has received Summit League Academic Honor Roll accolades each year and has competed in the conference indoor and outdoor championships each year.

Though she hasn't matched the 5-foot, 4.25-inch jump she had at Marian, Mingo said her collegiate athletic experience has been "very enjoyable. It requires a lot of time and effort, but it's fulfilling to be with your teammates and travel different places for competitions. I've gotten to do what I love. It's the best of both worlds."

Her academic world has been a steady diet of reading, memorizing lab experiments and exams.

"Track has always been a sport I love. Actually, it helps me in my academics. It's a break between classes to do what I love. It's not an added stress. It's more a fun activity that I get to participate in," said Mingo, who has been under the tutelage of jumps coach David St. John all four of her years at State.

"Coach St. John is such an amazing coach. He knows so much about the high jump, and he always puts his athletes first. He tells us we could be digging a ditch or in here jumping—have fun. The attitude of the jump group is to have fun. He's a very caring coach," she said.

TRANSFORMED AS AN ATHLETE

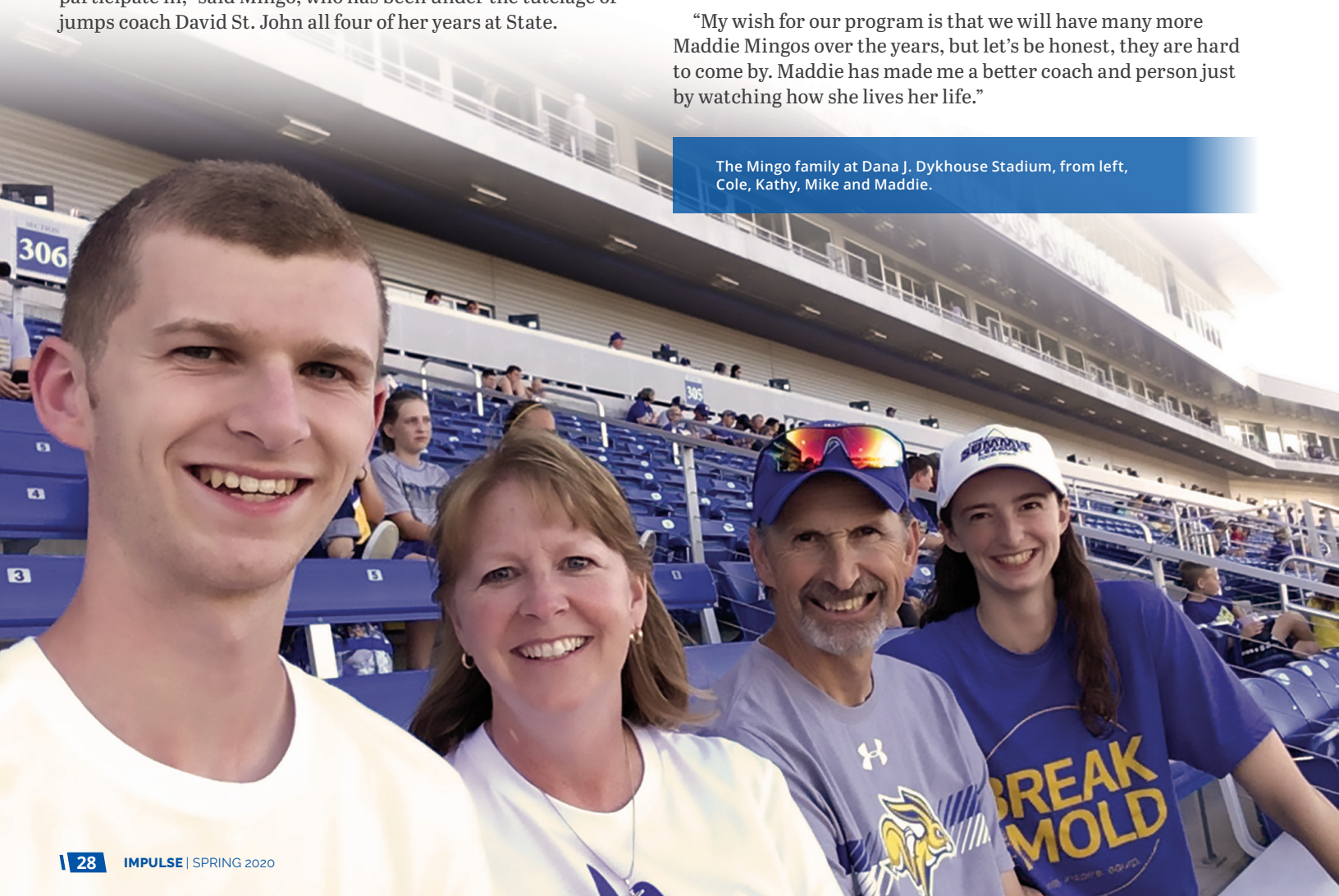
Mingo possessed a lot of natural ability when she began at State, but her idea of off-season training was playing basketball (three-year letter winner at Marian).

"I had no prior lifting experience, and I struggled with drills because they were new to me," Mingo said of her first season.

Now, as she enters her final season (presuming COVID-19 doesn't erase the schedule), she is most proud of "how I've grown as an athlete. Being able to lead those drills and be an example to the underclassmen in the weight room is very gratifying."

St. John said, "What makes Maddie a good leader are the same qualities that make her a good person. Maddie has a set of morals and values that she lives by, and she is not willing to forsake those values for a certain outcome.

"My wish for our program is that we will have many more Maddie Mingos over the years, but let's be honest, they are hard to come by. Maddie has made me a better coach and person just by watching how she lives her life."



The Mingo family at Dana J. Dykhouse Stadium, from left, Cole, Kathy, Mike and Maddie.

Above, left: Maddie, left, and Cole Mingo, natives of Omaha, Nebraska, have found a home at SDSU. Above: The hovercraft that Maddie Mingo helped create with three classmates in ME 230 in her sophomore year. The 18-inch-long craft placed fourth in a regional IAM3D competition sponsored by the American Society of Mechanical Engineers.

ACADEMIC HIGH POINT

The high point of her academic career was also a competition.

In her sophomore year, Mingo was in a class in which students teamed up to create their own design for a hovercraft and then built it with a 3D printer. Her team, which included fellow track athlete Peter Bates, won the class competition and advanced to the regional IAM3D contest sponsored by the American Society of Mechanical Engineers.

Because of a track commitment, Mingo wasn't able to make the trip to Michigan State, but the team finished fourth with its 1 1/2-foot-long hovercraft.

CLASS-COMPETITION CONFLICT

Track athletes can flex their practice if need be because of a class conflict, but road trips are another story. Between indoor and outdoor season, athletes are on the road most weekends between mid-January and early May. Mingo tries to take an extra class in the fall semester so spring semester can be lighter. But there is still work to be made up.

She recalls the 2020 indoor conference meet, which was in Fort Wayne, Indiana, an 11-hour bus ride from Brookings. Between a two-day drive each way and a two-day meet, the team missed a week's worth of classes. She collected the assignments in advance.

"I wanted to get all of it done before we left, but I worked some on the bus." After all, how many YouTube videos can you watch?

BROTHER GETS A TASTE OF SDSU TRACK

A bonus with those long road trips is they can be great bonding experiences with her teammates. In fall semester 2019, her teammates included her brother, Cole, who was a freshman. His priorities changed, and he didn't continue in the spring semester, but he still had good things to say about the program.

"All the people I met at the track program were great people, and they were very respectful when I said I didn't want to be on the team," Cole Mingo said.

So what advice would he give to freshmen who want to try their hand at athletics but whose primary focus is academics? "Be aware that what everybody says about the time commitment is true. But go for it if you want to try it. If it doesn't work, be honest with the coaches."

The 400- and 800-meter runner was familiar with SDSU from attending Maddie's meets with their parents, but the school wasn't on his short list.

SOLD ON CAMPUS TOUR

Nonetheless, in the fall of his senior year at Omaha Skutt, he toured SDSU. "I was blown away by the individuality (of the tour). It was cool to talk with the (mathematics) department head on my campus visit, and the size of the school and community seemed very welcoming," Cole Mingo said.

After a touch of homesickness early in his freshman year, he has made friends with fellow Honors Hall residents and gotten involved in activities.

Like his sister, he is involved in the Newman Center and teaches a Bible study through the Catholic Campus Parish. He also has proven to be an eloquent speaker. In the inaugural Jackrabbit Speaker Showcase for Speech 101 students, Mingo took first place with his seven-minute talk on appropriate and inappropriate phone use in class.

He also is involved the Council of Teachers of Mathematics, which is his future vocation.

Maddie Mingo is looking at a career in biomechanics. This summer she had an internship at the baseball pitching biomechanics lab at the University of Nebraska-Omaha and was motivated by that.

Dave Graves

MATT DENTLINGER

BASKETBALL STANDOUT ALSO MAKES MARK IN ME RESEARCH

If anyone would be adept at getting in the right position and transferring a sample into a bucket, it would be a 6-foot-8-inch, 240-pound basketball player.

But even for Jackrabbits forward Matt Dentlinger, the odds are literally astronomical. The senior mechanical engineering major, who holds a 4.0 GPA, is part of a four-student design team competing against teams across the nation in a NASA-sponsored contest dubbed "Moon to Mars Ice and Prospecting Challenge."

This is the fifth year for the prospecting challenge but the first year SDSU has fielded a team, according to mechanical engineering associate professor Todd Letcher.

Dentlinger and his classmates are taking on the challenge as their senior design project. It was one of several project ideas offered by Letcher and was the first choice for Dentlinger, who has distinguished himself on the basketball court as a second team All-Summit League selection in 2019-20 and the team co-leader in shooting percentage.

Playing college basketball was long a desire of Dentlinger, who grew up on a small farm in Arcadia, Iowa, but engineering wasn't an afterthought.

"I also was focusing on colleges that had an engineering program. When SDSU came along, they really were the perfect fit. It was a no-brainer decision," he said of the decision he made in the fall of his senior year.

PREPARATION PRECEDES SUCCESS

On the court, Dentlinger redshirted his first season (2017-18) and continued to develop in 2018-19, starting seven games and appearing in 32. As a redshirt sophomore, he was one of two Jackrabbits to start all 32 games, shot a league-best 70% in Summit games and averaged 12 points a game.

God-given size and innate ability help, but the results wouldn't come without preparation—time in the gym, weight room and film room, he said.

"You're not just going to be able to pick up engineering or pick up basketball and be good at it. You have to put the work into it—go to class, do the homework. You have to be consistent," said Dentlinger, whose academic preparation also included summer 2019 research work with Letcher and associate professor Greg Michna.

SUMMER RESEARCH WORK

That work was an effort to identify material properties of various 3D printing materials. They measured strength, stress, strain, torsion and thermal conductivity.

"I was really fortunate he offered that (position) to me," Dentlinger said. After having Dentlinger in class, it was an easy decision to offer him a summer position, Letcher said. Dentlinger created a database of the materials tested, printed the material and did some of the testing. Letcher said results of the shear stress limitations will soon be published in a scientific paper.

MOON TO MARS CHALLENGE

The Moon to Mars Ice and Prospecting Challenge asks teams to design and build hardware that can identify, map and drill through various subsurface layers, then extract water from an ice block in a simulated off-world test bed.

Up to 10 teams will be selected to receive a $10,000 stipend to facilitate full participation in the final competition at NASA Langley Research Center in Hampton, Virginia, next summer. Proposals were due Nov. 24 with teams to find out Dec. 22 if they were chosen. Even if not chosen, the team will complete its project in spring semester.

However, Dentlinger, who describes himself as a "competitive person," is planning on being selected. "Right now, we're just getting our initial design ideas and ordering parts," he said in mid-October.

Letcher explains, "This projects challenges student teams to design and build a system that can drill cores into a simulated lunar surface to get to an ice block from underneath the lunar surface. Next, the team must extract the water/ice from the hole, filter it to remove contaminants, and collect it in a bucket.

"The machine must be able to operate without human intervention. Additionally, the team must also determine what materials were under the surface and how thick each layer of material is under the surface."

Dentlinger said, "The project is very appealing because space has always been super interesting to me, especially now that they are trying to establish a base on the moon. This would be a steppingstone for the problems they need to solve to do that."

SENIOR YEAR NOT END OF CAREER

Though Dentlinger will graduate in May 2021, he isn't going anywhere soon.

The NCAA has declared that playing in the 2020-21 season won't count as a year of eligibility. That means Dentlinger can also play in the 2022-23 season (his sixth season at State) and he intends to do so. He is looking to go to graduate school or add a second major, possibly electrical engineering or business. He also would like to try his hand at professional basketball, possibly overseas.

"It's been a great experience overall, being able to attend such a good college of engineering ... and the men's basketball program has been a great experience. I've had a lot of fun."

He said the only way to make it better would be to have his senior design team selected for the NASA top 10 and his basketball team selected for the NCAA Tournament.

Dave Graves

STUDENT-ATHLETES

Wyatt Andersen, operations management, baseball
Alexander Auch, mechanical engineering, cross country, track and field
Lucas Ballard, data science, baseball
Bret Barnett, operations management, baseball
Josh Becker, ag and biosystems engineering, cross country, track and field
Will Bierschbach, mechanical engineering, swimming
Owen Bishop, mechanical engineering, baseball
Adam Bock, mechanical engineering, football
Matthew Borowicz, operations management, football
Ryan Bourassa, construction management, baseball
William Boyle, computer science, cross country, track and field
Trever Brenner, mechanical engineering/interdisciplinary studies, swimming
Thomas Breuckman, mechanical engineering, cross country, track and field
Parker Brown, civil engineering, swimming
Daniel Burkhalter, mathematics, cross country, track and field
Rozelyn Carrillo, mathematics, softball
Lindsey Culver, mechanical engineering, softball
Maria Currie, mathematics/data science, swimming
Baily Darnell, construction management, football
Katelyn Darnell, general engineering, track and field
Morgan Demarais, mathematics, softball
Matthew Dentlinger, mechanical engineering/general engineering/engineering, basketball
Bailey Dergen, electrical engineering/mechanical engineering, cross country, track and field
Bo Donald, construction management, football
Sianne Downes, mechanical engineering, swimming
Alyssa Eckstein, mathematics/mechanical engineering, swimming
Elizabeth Galera, mechanical engineering, track and field
Mark Gronowski, mechanical engineering, football
Caleb Gross, civil engineering, wrestling
Jonathan Gruetzmacher, mechanical engineering, football
Derek Hackman, computer science, baseball
Alison Hall, mechanical engineering, swimming
Janean Hanka, mathematics/data science, cross country, track and field
Rachel Head, computer science, equestrian
Abraham Hoskins III, computer science, football
Caleb Huizenga, civil engineering, swimming
Luke Ira, mathematics, baseball
Blake Iverson, mechanical engineering, cross country, track and field
Sam Johnson, construction management, swimming
Braxton Karnik, civil engineering, track and field
Matthew Katz, mechanical engineering, track and field
Krockett Krolikowski, construction management, football
Blake Kunz, data science, football
Aaron Kusler, construction management, football
Adam Kusler, construction management, football
Dalton Lakmann, civil engineering, wrestling
Mason McCormick, construction management, football
Mason McDonald, mechanical engineering, cross country, track and field
Ryan McDonald, mechanical engineering, baseball
Jared Miller, mechanical engineering, swimming
Madison Mingo, mechanical engineering, track and field
Michael Morgan, civil engineering, football
Blair Mulholland, construction management, football
Liam Murray, mechanical engineering, swimming
Amelia Nelson, ag and biosystems engineering, equestrian
Ben Olson, mechanical engineering, cross country, track and field
Gabriel Peters, mechanical engineering, cross country, track and field
Reid Pierzinski, mathematics, track and field
Nick Sayler, civil engineering, track and field
Cade Schoenauer, civil engineering, swimming
Dagen Schramm, mathematics, baseball
Marisa Schulz, mathematics, soccer
Michael Schwinghamer, biochemistry/mathematics, cross country, track and field
Matthew Sorenson, mechanical engineering, swimming
Sydney Stapleton, mathematics, basketball
Jocelyn Tanner, mathematics, soccer
Erik Thompson, civil engineering, swimming
Elisabeth Timmer, mechanical engineering, swimming
Lauren Van Dyke, mechanical engineering, track and field
Ryan Van Marel, mechanical engineering, football
Damon Venner, mathematics, swimming
Trajan Walhof, mechanical engineering, football
Hunter Wallster, mechanical engineering, track and field
Alex Westendorf, operations management, football
Adam White, computer science, football
Max White, mechanical engineering, swimming
Seven Wilson, construction management, football
Blake Wolters, ag and biosystems engineering, wrestling
Daria Yakovleva, mathematics, tennis

STUDENTS IN THE **ARTS**

THE PRIDE OF THE DAKOTAS MARCHING BAND

Sarah Aman, electrical engineering
Liberty Burckhard, civil engineering and computer science
Katrina Burckhard, mechanical engineer
Thomas Carlson, electrical engineering
Amanda DeBates, mechanical engineering
Alexandra Ercink, mechanical engineering and music
Turner Frank, electrical engineering
Dylan Hankel, mechanical engineering
Brett Hatch, civil engineering
Cameron Jensen, electrical engineering
Karline Johnson, mechanical engineering
Mason Krause, mechanical engineering
Noah Nielsen, electronics engineering technology
Laura Panuska, mechanical engineering
Nick Peterson, mechanical engineering
Caroline Reyner, music and mechanical engineering
Jay Rolfzen, electronics engineering technologies
Anna Salgado, mechanical engineering
Alex Schaar, mechanical engineering
Daniel Sharp, mechanical engineering, dairy manufacturing
Leo Steffl, electrical engineering
Lucas Waletzko, civil engineering
Hunter Williamette, agricultural engineering
Tjaden Wright, electrical engineering

CHOIR

Noah Bentley, computer science
Ethen Cole, mechanical engineering
Ryan Fick, electrical engineering
Samuel Maloley, construction management
Alexander McAnerney, computer science
Zachary Severson, civil engineering
Rhett Tinklenberg, construction management/engineering management

THEATER

Sara Broad, mechanical engineering
Grant Gunderson, data science

ENGINEERING STUDENTS TAKE TO SEWING

Five students from Jason Prout's General Engineering Technology, Society and Ethics class fulfilled a community service requirement by sewing face masks to help slow the spread of COVID-19.

The students were Jaime Peralez-Segura, Rizwan Kalana, Gashaw Melese, Moe Younis and Adam Coners. Peralez-Segura instigated the effort after realizing the need and gaining permission for the work to count for the class's six required hours of community service. The work was done in the home of his mother-in-law, Linda Vaa of Brookings.

JoAnn Fabrics of Brookings supplied the material, Vaa gave instructions and Peralez-Segura, who already had some sewing experience, spent two Saturdays in April sewing with two of his classmates each day.

They made 70 masks. Some went to a Walmart pharmacy in Minnesota and the others went to a nursing home in Flandreau.

CLARKE CHRISTIANSEN, '61 engineering physics, died July 30, 2020, in Brookings.

Christiansen enrolled at State after graduating from Huron High School. He served in the U.S. Army from 1957 to 1959 and returned to finish his schooling. He spent 36 years as an electrical engineer at Northwestern Public Service in Huron. He retired in 1997 as manager of substation controls.

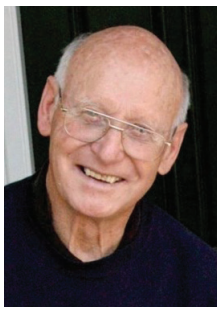
While in college and continuing into the early 1960s, he sang and played tuba and string bass for The Collegiates. He also played in the Huron Symphony Orchestra for more than 40 years and sang in the Grace Episcopal Church choir in Huron for more than 45 years.

Christiansen moved to Brookings in 2015. Survivors include his wife of 59 years, Shirley; two children, Diana (Howard) Bonnemann, Brookings, and Stephen (Stacy), of St. Louis; and four grandchildren.

BRAD JONES, '85 civil engineering, died Sept. 24, 2020, as a result of injuries from a fall.

Jones, 57, of Shoreview, Minnesota, was born in Sisseton and raised in Huron. After graduation, he began his career as a civil engineer with the Illinois Department of Transportation. In 1988, he moved to the Twin Cities to work with TKDA, where he served as engineer, project manager and client relations manager.

He is survived by his wife of 34 years, Jodi (DeKraai) and two children, Connor and Mackenzie.



FRED KURTZ, '59 electrical engineering, died July 5, 2020, at his home in Cupertino, California.

Kurtz, 89, a native of White, joined the U.S. Air Force after graduating from State and went on to have a long career with GTE Sylvania.

He is survived by his wife of 59 years, Donna; three children, Jenell Kurtz, Rhonda (Brett) Bonifay and Ginger (Jim) Coffey; and five siblings.

HARVEY MILLS, '50 ag engineering, died Sept. 11, 2020, at the Neighborhoods at Brookview in Brookings.

A lifelong Brookings resident, Mills, 94, served in the U.S. Army during World War II and then attended South Dakota State College. While at State, he constructed a shop to build boats. Before it was finished, he had an offer to complete it as a house. That began a 43-year career as president of H.E. Mills Construction Co.

Under his leadership, hundreds of homes, commercial buildings, churches and schools were built in eastern South Dakota. He also served on boards of the Associated General Contractors on a state and national level.

He is survived by three children, John (Joy), Mary Jo (David) Minor and Sally (James) Odenbach. He was preceded in death by his wife of 71 years, Midge; a son, Richard; and a brother, Marvin.

ALVIN MOEN, '57 civil engineering, died April 29, 2020, at Alexandria, Minnesota.

He enrolled at State after serving in the U.S. Navy. After graduation, he was hired by Hall Engineering, of Alexandria. He later became a partner in the firm's successor and also served as city engineer for Alexandria and other small towns.

Survivors include his son, Greg, and a daughter, Renee Salmon. He was preceded in death by his wife, Ophelia.

TROY NELSON, '90 electrical engineering, died April 4, 2020, due to complications from kidney disease and COVID-19.

Nelson, 53, of Huron, graduated from Salem High School. After graduating from SDSU, he took a job programming, testing and maintaining aquatic equipment with the U.S. Army Corps of Engineers at Waterways Experiment Station in Vicksburg, Mississippi. He received a master's degree from Mississippi State in 2002.

He later was an engineer that built scales in Hull, Iowa; was a programmer for a Sioux Falls banking software company; taught at National American University and Colorado University in Sioux Falls and had his own computer repair business. At the time of his death, he was a programmer for the Sioux Falls branch of Interstates Control Systems.

Nelson is survived by his wife of nearly 33 years, Mary; a son, Quinton; daughters Alana, Adara and Alora; his mother, Joyce Nelson; and five sisters.

ROBERT OLSON, '60 electrical engineering, of Watertown, died June 8, 2020, at a Watertown care center.

OIson, 89, graduated from Henry High School in 1948 and entered the U.S. Army. After discharge, he enrolled at State, earned his degree and began a 26 1/2-year career at Control Data Corp. in Minneapolis.

He was instrumental in bringing two new computer products to the Control Data product line, the Cyber 170 and the Cyber 180. Both computer families were unique systems developed by Control Data for engineering leadership in developing the processes essential to the production of a quality and cost effective product.

Olson was selected as a Distinguished Engineer by the Jerome J. Lohr College of Engineering in 1989, at which time he was a member of the dean's advisory council. He also worked on the establishment of SDSU's thin film research lab in Solberg Hall

and assisted with grant applications for mechanical engineering research projects.

Olson served South Dakota as an adviser to Gov. George Mickelson on new industry.

After retiring from Control Data Corp., he then started a fish farming business in Pequot Lakes, Minnesota, and owned that until moving to Watertown in 2015.

Survivors include a son, Robert Jr.; two daughters, Sandra (James) Bach and Penny (Daniel) Walters; six grandchildren and four great-grandchildren. He was preceded in death by his wife of 62 years, Gloria; and two sons, Gordon and Kenneth.

RANDY PETERSON, '86 ag engineering, died Oct. 3, 2020, at his Windsor, Colorado, home surrounded by his family.

Peterson, 56, was born in Brookings on March 16, 1964, to LaVonne and Adolph Peterson. He worked 30 years at Caterpillar in Peoria, Illinois, and two years at Woodward Inc. in Fort Collins, Colorado. He spent his career in various engineering and leadership roles developing advanced technology. He was awarded 19 patents and received numerous technical and sustainability awards.

Survivors include his wife of 19 years, Susan (Fransen) and their three daughters, Danielle (Kester), Kelly and Sydney; and three older siblings, Jan Selken, of Elkton; Reid Peterson, of Metamora, Ill.; and Mari Linden, of Dunlap, Ill.

LESLIE "LES" ROBERTS, '48 ag engineering, died Oct. 30, 2020, at Community Memorial Hospital Avera in Redfield, his hometown.

He was born Dec. 22, 1922, on the farm east of Ashton, that was homesteaded by his grandfather in 1882. He went to a one-room schoolhouse for grades 1-8 and was valedictorian of the Class of 1940 at Ashton High School. After graduating from South Dakota State, he started farming with his father.

He was chosen as a Distinguished Alum in 1998. He was a former board member of the SDSU Alumni Association and the SDSU Foundation. He funded numerous scholarships and programs at SDSU.

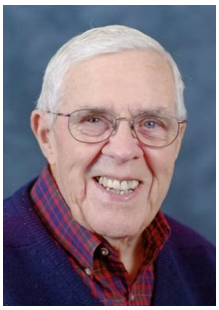
Survivors include four children, Ellen Boekelheide, Thomas, Kevin and Michael; nine grandchildren and 10 great-grandchildren. He was preceded in death by his wife, Wanda.

ROBERT SESTAK, '59 ag engineering, died March 20, 2020, as a result of COVID-19.

Sestak, 82, of the Seattle area, was born June 28, 1937, in Yankton and grew up on the family farm near Tabor. He began his career with the Bureau of Reclamation in Page, Arizona, and then worked on a dam at Rifle, Colorado, for two years. He then moved to Fremont, California, to accept a job with the Federal Aviation Administration.

Four years later his FAA career took him to Seattle. After his children were grown, he took a two-year position with the FAA in Salt Lake City. He then returned to Seattle and retired.

Survivors include his wife of 55 years, Louanne; a son, Paul; a daughter, Michelle (Trent) Hager; and six grandchildren.



WENDELL SCHWARTZ, '51 civil engineering, died March 31, 2020, in Salem, Oregon.

Schwartz, 94, grew up in Volga, where he graduated from high school. He briefly attended South Dakota State College before enlisting in the U.S. Navy for a three-year tour. He then returned to college, completed his degree and married Heraldine Woldt in 1949.

After graduation, he accepted a position with the Oregon State Highway Department as a surveyor. He advanced to regional construction and maintenance positions and ended his career in Salem as assistant state highways engineer.

Survivors include his wife; children Barbara Hegstrom and Victor Schwartz; a sister, Kathryn Peyton; and a brother, Donald Schwartz.

CALVIN VAUDREY, M.S. '50 civil engineering, died April 16, 2020, after a brief stay at an assisted living center in Goodyear, Arizona, 11 days short of his 96th birthday.

A native of Glendo, Wyoming, Vaudrey served in the Army Air Corp during World War II. After his discharge in 1946, he enrolled at the University of Wyoming, earning a bachelor's degree in civil engineering in 1948, when he moved to Brookings as an instructor in civil engineering teaching mechanics, hydraulics, structures and surveying at South Dakota State College.

In addition, he earned a master's degree in civil engineering in 1950 and a professional degree in water supply in 1954 from the University of Wyoming.

Vaudrey taught graduate and undergraduate engineering courses at SDSC until 1957. He established the Brookings office of J.T. Banner and Associates, consulting engineers, in 1953. He served as general manager of the South Dakota office and became president in 1969, serving in that capacity until he retired in 1989.

During the period of Vaudrey's guidance, Banner grew to an organization of more than 120 employees in offices in South Dakota, Wyoming and Colorado.

He was inducted into the College of Engineering Hall of Fame at the University of Wyoming in 2006. He was received the Distinguished Engineer Award at SDSU in 2015.

He is survived by a son, Kennon (Pegi), of San Luis Obispo, California, two grandsons, two great-grandchildren and an older brother, Russell, 97, of Woodcreek, Georgia. He was preceded in death by his wife of 54 years, Denice, and four brothers.

CHAD TEPLY, '93 mechanical engineering, was named senior vice president of project execution for Williams Companies in May. The Tulsa, Oklahoma-based firm is a leading provider of infrastructure for natural gas products.

Teply will oversee Williams' project management, construction, environmental, regulatory and permitting, facilities and land management activities across the company's 24-state operating area. Before joining Williams, Teply was senior vice president for business policy and development with the Berkshire Hathaway Energy unit PacifiCorp. At PacifiCorp, Teply was responsible for that firm's generation and transmission major construction activities.

"Chad has a proven track record of executive leadership and successfully delivering billions of dollars of energy infrastructure projects. He brings a valuable mix of experience to our project execution team," according to Michael Dunn, Williams' chief operating officer.

ERIN (RICHTER) STEEVER, '01 civil engineering/'05 master's in environmental engineering, received the George Warren Fuller Award from the South Dakota American Water Works Association this fall for exceptional service to the water supply field.

Earlier this year she joined Bartlett & West in Sioux Falls as an engineering specialist. Steever has 17 years of water supply industry experience. She also is the Region 7 governor of the American Society of Civil Engineers, a past recipient of its Outstanding Young Civil Engineer Award and a graduate of Leadership Sioux Falls.

SCHAEFER HONORED FOR DEVELOPING GEOTECHTOOLS

Vern Schaefer '78, a professor at Iowa State University, will receive the 2021 Wallace Hayward Baker Award from the American Society of Civil Engineers Geo-Institute in May.

The award recognizes Schaefer for "his outstanding work on promoting and conducting soil improvement technologies and developing GeoTechTools as a comprehensive, systematic selection tool," the Geo-Institute Awards Committee reported.

Schaefer was the lead investigator for the $3.7 million SHRP2 project, which developed GeoTechTools. The web-based information and guidance system that identifies solutions to common and complex geotechnical issues. Developed through the second Strategic Highway Research Program, it has identified 46 geotechnical solutions to common embankment, cut slope, structure foundation interface and pavement foundation issues.

During the five years of development, Schaefer worked with 11 co-investigators from three universities and more than 50 graduate students.

The site went live in November 2012 and was housed at Iowa State until June 2019, when it was moved to the Geo-Institute.

Designed to provide additional information for state highway departments, about half the technologies are traditional, 25% are fairly new and 25% are emerging technologies.

"New technologies can be implemented that will drive down costs and allow the work to be conducted faster, but highway designers and contractors are historically hesitant to try new technologies. GeoTechTools is designed to make it easier to do so," Schaefer said.

About 50% of the site's users are consulting engineers working for highway departments, 25% are state highway department engineers, 10% are contractors and 15% are faculty and university students. "It's a great teaching tool. It's used in classrooms in at least 20 schools," Schaefer said.

The site is updated periodically by Geo-Institute technical committees. It can be accessed at www.geotechtools.org.

Schaefer, an endowed professor in geotechnical engineering, holding the James Hoover Chair in Geotechnical Engineering, has been at Iowa State since January 2003. He was at SDSU from August 1988 until December 2002, progressing to acting department head in July 1999 and appointed permanent head a year later. He also served as a geotechnical engineering specialist while on sabbatical with the Federal Highway Administration from July 2013 to June 2014.

Schaefer's research has covered a wide variety of geotechnical and geoenvironmental engineering areas, predominantly in landslides, slope stability and ground improvement.

ALUMNI ENJOY COMING BACK FOR WORK

South Dakota State University already has a Thorne Hall but 2009 graduate Joe Thorne is putting his own name on multiple buildings on the Brookings campus.

Thorne—who was named after his uncle Joe Thorne, the namesake of Thorne Hall—is one of McCownGordon's superintendents for the Raven Precision Agriculture Center after serving in the same role for the Animal Disease Research and Diagnostic Laboratory expansion. The older Joe Thorne was an all-North Central Conference football player and the first South Dakotan to die in the Vietnam War.

Being from Brookings, Thorne's experiences on campus growing up allowed him to know SDSU was the right fit for his college education.

However, there was some wavering when it came time to pick a major. He initially chose construction management but then thought of going into a health profession field. Construction management eventually won.

"I like working with my hands and wanted to go into building. My dad was a builder so I'd been doing residential construction since I was 14. I really enjoyed seeing the process through. Every day you accomplish something," Thorne said.

But more importantly, Thorne said relationships built with the professors such as Norma Nusz Chandler and former department head Pat Pannell were key indicators that he made the right decision.

"At the end of the day, I knew there were going to be opportunities with a construction management degree," Thorne said. "In construction, you could make good money and that's where my head went. From working with Dad, I had gotten my feet wet, I enjoyed it and wanted to see where I could go."

However, graduating during the Great Recession meant not many jobs were available. While working with his father, Thorne received a call to work on an airport demolition and rebuild in Rifle, Colorado.

"I was a project engineer on that job, and it was awesome," Thorne said. "It just happened to be with a company that I had built a relationship with through the CM department. The student club would hold a pheasant hunt every year, and I had established a relationship with them. I must have been the first person to get a 'we have a job opening, we'd like you to come work with us' call,"

Another personal relationship helped Thorne land his current position with McCownGordon.

"Matt Hohn (SDSU CM grad '08) came out to visit on a snowboarding trip and said McCownGordon was expanding to Manhattan, Kansas, and was looking for good people. He said, 'I want you to come work with me,'" Thorne said. "I hadn't worked on commercial construction projects yet but I was looking to expand my horizons and learn something new."

Now, 11 years later, Thorne is back at South Dakota State.

"From day one when I heard about the opportunity, I said I'll go up there," said Thorne, adding it's a privilege to have the opportunity to make a mark on the SDSU campus. He's joined by Michael Hickman '09, a former college roommate; Keegan Heisinger '18; Christie Muilenburg '17; Tricia Bierschbach '17 and Jeff Lewis '20 for the two on-campus projects.

From left, Jeff Lewis '20, Christie Muilenburg '17; Joe Thorne '09, Tricia Bierschbach '17 and Michael Hickman '09. Keegan Heisinger '18 was not present for the picture.

"When our CM graduates represent SDSU on multimillion-dollar construction projects, they are accomplishing what we planned for and expect them to do. Having alumni back on campus on these projects is a great way to show current students where their CM degree can take them," said Teresa Hall, who leads the Department of Construction and Operations Management.

Colin Gaalswyk '94/M.S. '00, senior mechanical engineer with SDSU Facilities and Services, agrees with Hall but admits there is a different feeling, too.

"As an alumnus, I also feel that we have a more personal interest in completing a high-quality facility that will significantly impact the education and research of future generations of graduates," Gaalswyk said.

But Thorne said construction, whether at SDSU or elsewhere, is more than just ordering materials and reviewing plans.

"It's not just putting up a building," he said. "You develop and establish relationships with the contractors. Some of the foremen on this job came from our last job on campus. You build a rapport with them and learn how they best work. Yes, some days are a lot more challenging than others and some are more rewarding than others but at the end of the project, you've accomplished something great.

"To top it off, I get to work with one of my best friends (Hickman) every day. It's fun to see where we've come from and compare it to some of the other team members. You feel a sense of unity. Yes, we're Jackrabbits, and we're on our campus. I know we're all proud to be working on this project. It's a great feeling."

Matt Schmidt

GENE SIEVE

FROM FARMYARD MECHANIC TO CORPORATE VP

Leon Sieve saw the innate engineering ability of his 15-year-old son when he brought back to life the farm's ailing Case IH combine or found a way to get an obstinate baler to cooperate.

Leon suggested that Gene Sieve take his penchant for farmyard troubleshooting to South Dakota State to gain some formal engineering training. Fortunately, Gene was a teenager who listened to his father. He enrolled at State in 1986, earned a bachelor's degree in mechanical engineering in 1990 and used that to catapult him to a successful career with Burns & McDonnell, an employee-owned construction, engineering, architecture and environmental firm with more than 55 offices and 7,000 employees worldwide.

His achievements at Burns & McDonnell fueled his selection as a 2020 Distinguished Alum at SDSU. Sieve and his five fellow selections will be formally recognized during the 2021 Hobo Day celebration because the COVID-19 pandemic forced cancellation of activities this fall.

Campus was only about 100 miles from the Sieve's Lismore, Minnesota, farm and two older siblings had already made the trek to Brookings. That easy college choice was confirmed when he settled into Mathews Hall and "made a lot of really good friends, people with similar upbringings from rural America and a lust for life."

When not in Mathews, there was a good chance he was studying in the library or playing pickup basketball in The Barn, where he rubbed shoulders with student-athletes.

MEMORABLE PROFESSORS

Sieve also got involved in student chapters of the American Society of Mechanical Engineers and the American Society of Heating, Refrigeration and Air-Conditioning Engineers, which broadened his perspective through trips to an oil refinery and truck manufacturer, as well as a chance to know current mechanical engineering department head Kurt Bassett as someone more than a faculty member.

"I still consider him a friend," said Sieve, who lives in Excelsior, Minnesota, and is a Burns & McDonnell vice president in the Twin Cities.

Bassett had only been in the classroom a few years then after having worked for Johnson Controls after earning his master's degree. "He brought some real-world practical knowledge to the classroom," Sieve recalls. He also remembers Oren Quist's physics classes, Hamid Hamidzadeh's vibration classes and Chuck Redmond's machine design classes.

Sieve considers a couple of his summer jobs as valuable as his classroom learning.

After his sophomore year, he worked at Rosco Manufacturing in Madison, which made highway equipment. "That gave me an appreciation for equipment design." After his junior year, he and two other SDSU engineering students spent a summer in Los Angeles taking air samples for an industrial hygiene company. "Taking the country boy and throwing him in the middle of the city" gave Sieve the confidence to live on his own in Kansas City in his first job out of school.

BURNS & MCDONNELL CAREER BEGINS

Joining Burns & McDonnell right out of college, Sieve began his career working on major military and aviation projects around the world including Hawaii, Taiwan, Egypt and Jordan.

Sieve left Burns & McDonnell in 1998 to return to Minnesota. In 2007, Burns and McDonnell offered him a management job. Sieve countered, "How about an office in Minnesota?" Burns & McDonnell challenged him to put together a business plan. A few months later Sieve opened a two-person office in Bloomington.

Now the Twin Cities office employs nearly 120 design professionals and has managed more than $1 billion in capital infrastructure projects, serving a diverse portfolio of clients that include Xcel Energy, U.S. Army Corps of Engineers and Delta Airlines.

Through his commitment to his team and the firm's growth, which now also has offices in Sioux Falls, Duluth, Minnesota, and Bismarck, North Dakota, he was promoted to a vice president in 2016.

FINDING SUCCESS IN HOME STATE

In 2017, the Minnesota chapter of the American Council of Engineering Companies selected Burns & McDonnell as its Minnesota Firm of the Year. That was due in large part "to the impact Gene has made on the organization and engineering community," according to Paul Fischer, president of Burns & McDonnell's regional office group.

The Minnesota office has consistently been named among the top engineering firms and best companies to work for by publications such as the Minneapolis/St. Paul Business Journal and Minnesota Business Magazine.

In 2015, Sieve received the President's Award from the American Council of Engineering Companies for his dedication to advancing Minnesota's engineering community. He served as Minnesota chapter president in 2012-13 and national director in 2013-14.

In describing Sieve, words like dedicated and intelligent are used by David Yeamans, president of Burns & McDonnell's Aviation and Federal Division and a corporate board member.

"Gene exhibits many qualities that not only make him a good friend, but a great business partner. These qualities include intelligence, self-motivated, truly dependable, totally dedicated, creative and a precise written articulation of the English language.

"Gene has a winning spirit coupled with talent and ambition for self-improvement and achievement. Gene has earned my complete trust and confidence and exemplifies the hard work, entrepreneurship and employee-owner culture that we expect from our leaders."

A HABIT OF GIVING BACK

Sieve has invested in the industry through supporting children's STEM initiatives, serving on the board of trustees for The Works Museum, the Minneapolis-based learning center, and serving on the dean's advisory council for the Jerome J. Lohr College of Engineering since 2015.

"It's been very beneficial to understand a lot of the back-of-house challenges that the administration faces, the funding, working within the university system and the process for making decisions that are impacting the college," he said of his council experience. "It's an interesting group of professionals on the council, a vast array of industries and locations."

Community service includes serving on the Greater Twin Cities United Way campaign cabinet—the Minneapolis office has had the highest participation rate in Burns & McDonnell's annual national United Way campaign—and on the board of the Metropolitan Economic Development Association, an organization dedicated to providing business consulting, access to capital and market opportunities for Minnesota's minority entrepreneurs.

At home, you will find the Jackrabbits flag flying in the land of Gopher fanatics. "I'm never bashful about telling people where I went to school."

Dave Graves

DEAN'S CLUB

FROM JAN. 1 TO SEPT. 30, 2020

Dean's Club membership consists of alumni and friends who have contributed $500 or more annually to the Jerome J. Lohr College of Engineering. Dean's Club members are recognized as devoted friends of the college who make a significant impact on the college's future. They also will receive invitations to special college and university functions and updates from the dean.

500-999

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BEYOND 20/20 VISION

The year 2020 has been the most challenging and unusual year that most of us have experienced. The challenges we have faced personally and professionally are numerous. Concerns for health, family, career, community and country have weighed heavily on our minds since we first heard the phrase "COVID-19" in late February.

If you previously used the term "2020," you were most likely referring to "20/20 vision" with no relation to a calendar year. When most people hear the term 20/20 vision or find out they have 20/20 vision, they understand that to mean that they have "perfect vision." Perfect vision would mean you are able to see what is before you and be prepared for what is ahead. However, in the year 2020, we are more likely to think only one day or one week ahead. There are too many unknowns in the days of COVID-19. Unknowns such as in-person school or the struggling economy hinder us from looking too far into the future. That is understandable, considering we live in an unpredictable world, but then haven't we always lived in an unpredictable world?

You might remember an article in the spring 2020 edition of IMPULSE on the strategic plan developed by the leadership of the Jerome J. Lohr College of Engineering. This article included a two-page graphic known as the "Philanthropy Placemat," which depicts the vision and strategies along with the resources needed to accomplish the goals over the next five years. Living with the placemat over the past nine months of 2020 has helped me appreciate the power of this strategic plan and how it can help us focus beyond 2020.

This plan includes three primary college initiatives that are the defining ladders for accomplishing the strategies:

- 4th Industrial Revolution,
- Resilience for our Communities and the Environment, and
- Building Tomorrow's Leaders and the Economy.

The "4th Industrial Revolution" will help the college stay focused on the new technologies that will create our future and solve future problems. "Resilience for our Communities and the Environment" is the sustained ability of a community to use available resources (energy, communication, transportation, food, etc.) to respond to, withstand and recover from adverse situations. Lastly, "Building Tomorrow's Leaders and the Economy" is making sure that we stay focused on how we are preparing graduates to build tomorrow and lead our economy.

These initiatives lay the groundwork for how the graduates and faculty of the Lohr College of Engineering will have a positive impact on an unpredictable world for many years to come. Turning this strategic plan into reality requires the combined efforts of SDSU faculty and students, community, industry, alumni and friends. I encourage you to take another look at the strategic placemat included in the spring 2020 edition. Let this plan inform you and inspire you to ask how you can help SDSU and the Lohr College of Engineering develop this vision for the future.

The memories of 2020 will be with us forever, and we will likely remember them with 20/20 clarity. However, our actions today will allow us to create a future with a vision for tomorrow and beyond.

Tom Becker '81

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Nicholas Uilk, an instructor in the Department of Agricultural and Biosystems Engineering, won a national teaching award from the Association of Public and Land-grant Universities in recognition of excellence in agricultural sciences teaching and student engagement at the association's annual meeting Nov. 4.
See more faculty news beginning on Page 8.